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VARIOUS LECTURES

— 1892 TO 1904 —

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BY

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GLASGOW.

— 1908 —

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THE PROGRESS OF DEATH

IN

SCOTLAND AND HER COUNTIES SINCE 1855:

A COMPARISON.

—o—

Since you did me the honour to elect me President of this Association, I have been somewhat anxiously meditating upon an address which might be instructive and at the same time run on paths comparatively untrodden.

In these days of general enlightenment and voluminous publication, the observant mind soon becomes impressed with the salient features of any applied science. The science of sanitation is not excepted from this rule. It is young in years, but in the heart of the nation it is growing mature and strong. Men and women in this kingdom are now coming to understand and believe that, "in order to the prevention of filth diseases, the prevention of filth is indispensable;" and not only so, but also to appreciate, to some extent, Sir John Simon's other truism, that "the exacter studies of modern times have further shown that, by various channels of indirect and clandestine influence, filth can operate more subtly and also far more widely and more distinctively than our forefathers conjectured."

Two hundred years ago some of the fashionable and aristocratic celebrities of London stepped into their palaces, round the thresholds of which heaps of cabbage stalks and rotten apples

had accumulated, and Macaulay tells us that at that period St. James' Square was a receptacle for all the offal and cinders, for all the dead cats and dead dogs of Westminster. The corollary of this state of matters was a death-rate of 1 in every 23 persons per annum, or 43 per 1,000.

It is consequently obvious that such distant forefathers as these had "conjectured" little regarding filth *versus* health. To-day we are in many aspects of public health far past the conjectural period. We have arrived after great labour in the haven of certainty, and throughout the land, in the minds of even the ignorant and formerly unsympathetic, is arising a partial revolt against preventable disease and its causes. To us is given the proud position of leaders in the revolt. To make effective a further onslaught on the known enemies of health and life, we must carry extended convictions to the great body of the public, and I am firmly persuaded the London *Times* was on the right lines in its editorial of 11th August on the Congress of Hygiene and Demography, lately held in London, when it said—"The most pressing work of sanitary reformers is not now so much to legislate as to educate."

In thus expressing myself, I do not wish it to be inferred that I am satisfied with our Public Health Act of Scotland.

Before I conclude, I think I will be able to show that death from one dreadful preventable malady practically remains unchecked in our land. I refer to tubercular disease. The graves filled by tuberculosis are year by year far too many, and it will be one of the foremost aims of my address to-day to show with certainty how we stand statistically as a country in relation to this scourge. I thought it would be new and instructive also to demonstrate the general progress of health in Scotland, and the particular decrease and increase of death in her thirty-three counties since registration in 1855 to 1888—first, from all causes; second, from zymotic disease; and third, from tubercular disease. I trust I am not in error in believing that the pictures of death thus delineated will serve a threefold purpose, namely—(1) To excite the interest and attention of our legislators and our central authorities; (2) to produce a healthy stimulus to sanitary activity in our county and burghal Local Authorities; and (3)

to exhibit to the people at large in a simple, graphic, and incontestable manner, the past triumphs of sanitation over disease in some localities, and otherwise the triumphs of disease where and when probably few or no attempts have been made sanitarily to check its progress.

Before entering upon these demonstrations, it is due to explain to this Congress, as briefly as I can, the methods adopted and the basis upon which my thesis rests.

First of all, permit me to state my thesis. It is, that while Scotland as a country has advanced during the past 33 years in public health, and the death-rate from zymotic disease has all over been greatly reduced, tubercular disease has not made a corresponding advance, and in a considerable number of localities has in this period been stationary or increasing; and further, as tubercular disease is now known to be largely preventable, and has been proved to be communicable from man to man and from animals to man, the time has come when it is desirable and necessary, in the interests of the people, to have such special legal powers from Government as shall, when applied, materially reduce the death-rate from this class of disease.

To prove the first of my premises I had recourse to the Scottish Registrar's yearly returns. From these 33 statistical haystacks we have the directing lines of mortality, which you see pointing upwards and downwards in the diagrams before you.* The single diagrams at the top represent in a striking and lucid way the successes of our "last enemy" among the people of Scotland and in each of our counties from year to year since 1855. The deaths represented here are from all causes in each 10,000 persons living. Immediately beneath this "all causes" diagram you will observe two interwoven diagrams—one drawn in full black line, the other in dotted line. These represent the number of deaths in Scotland and in each separate county which occurred yearly since 1855, (1) from zymotic disease and (2) from tubercular disease out of each 100 deaths from all causes.

* See diagrams accompanying this paper. In the diagrams showing Death-rates from All Causes per 10,000, the rates range from 100 at the bottom to 310 at the top. In the Zymotic and Tubercular diagrams, the percentages range from 0 to 40.

The upper diagram, accordingly, exhibits the *general* progress or retrogression of the people in healthfulness; the lower ones, the progressive incidence upon the general death-rate of the two classes of disease which are most destructive, and which are more directly amenable to sanitary influences.

In connection with the lower diagrams, let me here explain what I have put down as zymotic, and what as tubercular disease. The Registrar-General of Scotland has twice changed the list of diseases called "zymotics" since 1855—viz., in 1877, when Dr. Farr's nomenclature was used for the first time; and in 1883, when the "classes" and "orders" of disease were enlarged and again rearranged. Six "orders" of disease appeared this year in the class "zymotic" instead of four; while to the "constitutional" class four sub-orders were added, two of them—viz., rheumatic fever and purpura being taken from the zymotic class. All this rearrangement was doubtless scientifically necessary, but is to the statistician, among such a plethora of figures, a source of perplexity and trouble. The prevailing custom in calculating death-rates from zymotic diseases is to take what are called the seven principal orders. These are—small-pox, measles, scarlet fever, typhus, diphtheria, enteric fever, and hooping-cough. To make these zymotic diagrams as comprehensive as possible, I have added to this list chicken-pox, relapsing fever, simple and ill-defined fever, simple cholera, diarrhœa, dysentery, erysipelas, and croup. The last mentioned disease is added for two reasons —first, and mainly, because up to 1877 it is hopelessly entangled with diphtheria in the Registrar-General's reports; and secondly, it has been thought by many experts to be the same disease as diphtheria, especially in its membranous form, and a predisposition to it appears to be caused by imperfectly drained dwellings, sewer emanations, and low lying sites.

Tubercular disease, the rates for which are shown by the dotted line diagrams, includes all deaths through phthisis, tabes mesenterica, tubercular meningitis, and scrofula. These four main so-called constitutional diseases are taken by the Registrar-General up to the latest date to represent the sum total of devastation wrought by the tubercular virus. The line of death representing the yearly incidence of this dreadful disease on the

various populations in the counties of Scotland, high as it may appear in the diagrams, is, I am convinced, below the real level. This is not the fault of the Registrar-General or his various assistants throughout the country. It is well known that the word *consumption* is a terror in families, and the popular belief that it is in itself the legacy of heredity interferes with many medical men, and has a tendency to hinder them from telling under their certificates the whole truth. This is especially the case when ladies of marriageable age happen to be among the bereaved. Surely some method could be devised (and it certainly ought to be) whereby the medical attendant may be legally required to write upon his certificate the true cause of death, and hand it, or send it *direct*, to the local registrars without submitting it to the scrutiny of relatives. In the minds of true sanitarians and vital statisticians, any system which tends to bring influences to bear against a statement of the real facts stands condemned. If secrecy be necessary and expedient, by all means let us provide for secrecy, but not at the expense of truth.

Having said so much, let me now draw your attention to the diagrams and the table of septennial death-rates. It is far from my intention to weary you with any detailed review of these diagrams. Each of them will, I think, repay quiet and thoughtful study, and it is my hope that if they are placed before you in a reduced and compact form, you will not find it waste of time to bestow this upon them. The essential part for us at the present time is what they prove, and to a statement of this I address myself.

From the initiation of the Registration Act for Scotland in 1855 down to the year 1862, our country may be said to have existed, sanitarily speaking, in the most nebulous condition. Our legislators were just awaking about this time to the fact that the apparently deeply rooted philosophy, to the effect that each death was to a very small circle calamitous and distressing, but to the social fabric of the State was more or less advantageous as it removed a consumer of the common stock, was a vast mistake. It was beginning to dawn upon them that every death under the non-productive age period was a total loss to the community at

large. The cholera epidemic had in 1848-49 devastated Scotland and filled all classes with intense alarm, and the State Board of of Health were urging Scottish centres of population to bestir themselves to greater cleanliness. Yet it was not until 1862 that Scotland obtained anything approaching sanitary powers, and these were meagre at the best. Accordingly, I have taken the seven years wherein we had the benefits of registration previous to 1862—namely, 1855 to 1861, both inclusive—and exhibit upon a table—first, the average death-rate from all causes per annum per 10,000 inhabitants in Scotland, and each of her counties for these seven years ; second, the average percentage of these deaths attributable to the zymotic diseases I have already named ; third, the average percentage of these deaths attributable to tubercular disease.

These appear in three columns on the left hand side of the table, and together they may be termed the statistical sanitary picture of "Earliest Scotland," as previous to 1855 we can get no authentic vital statistics anent our country. It will be observed that the various counties are arranged according to the lowness of their respective death-rates from all causes. Against these figures are given upon the right hand identical equivalents for the last septennial—viz., 1882 to 1888. The figures down the centre show the changes which have been made as between the various counties, in the order of their least mortality from all causes.

During the twenty-one years which elapse between these two septennial periods, it might reasonably be imagined that in every part of Scotland a steady advance in life-saving among the people had been going on, as for a long time previous to 1882 we had legal instruments at command wherewith to elevate the public health to a certain degree of excellence, if the various responsible burghal and parochial authorities had done their duty.

The table now before you holds up the mirror to the duty which has been done. The difference in Scotland between the all causes death-rates of the first septennial and the same rate in the second is 14·43 per 10,000 of the population per annum. This means a saving of life during these last seven years to the extent of 5,561, every year calculating the population of Scotland

as at the middle year—viz., 1885, or a total saving during the whole term of the septennial of 38,927 lives.

Gentlemen, this is a portion of the reward of sanitation, but a greater reward still is shown by the first diagram, as the heaviest incidence of death upon the inhabitants of our land is there shown to have been between the years of 1864 and 1875. Even a more direct evidence of the effect of sanitary work is shown by the general decrease of mortality from zymotic diseases. During the course of the first septennial, 21·28 per cent of the total deaths were from zymotics.

In the last septennial the percentage fell to 13·16, or a decrease of 8·11 per cent. I regret I cannot give a similar account with respect to tubercular disease. Our progress against this dread enemy of life has been by comparison microscopical. 16·14 per cent of our total dead fell victims to this plague in the first septennial, and 14·48 per cent in our last, or a difference in favour of our last of only 1·66 per cent.

Having now glanced at our country as a whole, let me analyze a little, and show you where public health has improved, where it is stationary, and where matters have grown worse. Taking the death-rate from all causes first, the following counties show, in comparing the two septennial periods, an improvement of over 10 per 10,000 living—viz., Haddington, Nairn, Aberdeen, Perth, Stirling, Dumbarton, Ayr, Forfar, Edinburgh, Renfrew, and Lanark. Those that show an improvement under 10 per 10,000 are Peebles, Kincardine, Banff, Roxburgh, Fife, and Kirkcudbright. The counties which have remained stationary are Berwick, Ross and Cromarty, Sutherland, Wigton, Dumfries, and Bute.

It is now my duty to point out that ten counties have apparently gone back in health, six of them to an extent less than 10 per 10,000, and four of them over 10 per 10,000. The former lot of these "black sheep" comprise Linlithgow, Clackmannan, Kinross, Argyle, Elgin, and Orkney; the latter, Selkirk, Inverness, Caithness, and Shetland.

In fatalities from zymotic disease, the table and also the diagrams show a universal progression in the right direction. No county bears the terrible stigma of being reactionary with

regard to truly infectious maladies. While this is so, it will be observed that a few counties have been lingering on the way. I take an example. It is the pigmy county of Scotland—little Clackmannan. From 1855 to 1861 her average zymotic rate was 16·71 per cent of her total deaths. In the 1882-88 septennial it was 13·78, or 2·93 per cent of an improvement in twenty-one years. Her little twin-sister, Kinross, in the same period made an advance of 8·97 per cent, or over three times greater progress. The county which has the highest credit, from the table and diagrams illustrative of the progress of zymotic disease, is Forfarshire. No less a difference than 12·70, or nearly $12\frac{3}{4}$ per cent, is shown in the last seven years over the first seven. A very high zymotic rate was maintained in this county until 1874, after which, as if by magic, these diseases fell from their deadly eminence of 28 per cent to 16 per cent in 1875, and they have rarely done much more mischief up to 1888. Forfarshire is to be congratulated on her success in grappling with zymotics, as although she is handicapped with the third city in Scotland—"Bonnie Dundee"—and although she is only thirtieth in general healthiness, in freedom from a high zymotic rate she ranks twenty-third.

The county which in the 1882-88 septennial shows absolutely the lowest average zymotic rate is Orkney at 5·74 per cent. The lowest rate during the 1855-62 septennial was 9·57 in Sutherlandshire, so we see that progress in this direction has been made even in minimums.

Speaking generally, in similarly conditioned communities a universally low rate of mortality from infectious disease indicates a high rate of health administration. Sanitary zeal means shrinking zymotics. Liberal expenditure for health purposes by any sanitary authority may be taken as indicative of sanitary zeal. In making these statements I have my eye at present on one of our most beautiful pastoral counties, through which the Ettrick and Yarrow flow in pellucid sweetness. Selkirkshire, rich in beauty and historic associations, is, alas! also rich in zymotic death. Her position is so strange in this respect, compared with her surrounding neighbours, that I was tempted to enquire into the cause.

You will observe from the table that, while Roxburgh and Peebles have an average zymotic rate of 10·84 and 9·54, Selkirk, although eighth among the counties in her general rate, permits 13·13 per cent of her dead to succumb to this class of diseases. If she were arranged according to her zymotic rate she would fall from being the eighth in position to the twenty-sixth.

Now I find from Dr. Skelton's *Handbook on Public Health and the Local Goverment Act*, page 54, that Selkirk, as a county under the Public Health Act, 1867, administered by the Parochial Boards, had the following staff to carry on sanitary administration :—Medical officers, none; sanitary inspectors, 5; total amount of salaries paid to these five sanitary inspectors, £16, 10s. per annum, or at the rate of £3, 6s. each. I find also from the annual reports of the Board of Supervision from 1882 to 1888, that the total expenditure for public health purposes in all Selkirkshire during these years was £1,974. I have mentioned the zymotic rates of Roxburgh and Peebles in comparison with that of Selkirk. Let us see how they compare as to the means employed and the money expended in the cause of public health. Roxburgh, having fully double the population of Selkirk, employed in the county 9 medical officers at an expenditure of £28, 14s. per annum, and 24 sanitary inspectors at an expenditure of £95, 19s. per annum ; while, in the course of the seven years 1882 to 1888, she spent no less than £44,824 in the cause of public health. Peebles, with a population almost the half of that of Selkirk, had for county purposes, 2 medical officers costing £4, 16s. per annum, and 10 sanitary inspectors at an outlay of £35, 10s. per annum ; and in the seven years for public health purposes she spent £7,981, or, with half the population, £6,007 more than her populous sister. Other, and to me unknown, causes may be at work to place Selkirk in her unenviable position; but it is quite evident that what her people have gained in pocket they have more than lost in zymotic filled graves.

Other counties, such as Linlithgow, Renfrew, and Lanark, exhibit features in this respect of melancholy interest, and it behoves the burghal and county authorities within them to purge their districts of diseases, which have no right there in the proportions in which our table and diagrams find them. This

remark may be said to apply with greater force to Linlithgowshire than to the other two, in that the latter have within their borders the busy centres of compacted population, where the zymotic bacteria can slay their victims in the greatest numbers. That we should find Linlithgow, over the last seven years, permitting infectious disease to prevail to such an extent as to place her third from the worst in Scotland, is, to say the least of it, unexpected ; but, while it casts unavoidable reflections on her past authorities, it should form a strong incentive to her new authorities to spare neither money nor pains to regain for her her true position among Scottish counties. I would fain linger upon these zymotic diagrams, and show how they influence the "all causes" diagram above them, how the sharp peaks of the one are often faithfully reproduced year after year upon the other; but I must pass on, contenting myself with calling the students' attention, especially those of Scotland, to Caithness, Elgin, Aberdeen, Forfar, Perth, Clackmannan, Dumbarton, Renfrew, Edinburgh, Peebles, and Dumfries.

We now come to consider the thirty-three districts of our country in relation to tubercle in its fourfold forms. The first thing we see in looking at the dotted line diagrams is the even lines of death-rate which they show for the most part. In scrutinizing closely, however, we find that a gradual, though very small improvement has taken place in twenty-two counties. These are Orkney, Caithness, Sutherland, Inverness, Ross and Cromarty, Kincardine, Elgin, Banff, Nairn, Argyll, Kinross, Perth, Aberdeen, Ayr, Bute, Dumbarton, Edinburgh, Renfrew, Lanark, Berwick, Roxburgh, and Wigtown. In six counties the tubercle bacillus has apparently held his own—namely, in Clackmannan, Haddington, Linlithgow, Stirling, Forfar, and Dumfries ; while in the remaining five this insidious foe has actually gained ground since the early years of the fifties. These five are Shetland, Fife, Selkirk, Peebles, and Kirkcudbright. As might naturally be expected from its situation, its dry and bracing climate, and its free loamy soil over a gravelly or sandy substratum, Nairn bears the palm along with Inverness among the counties for freedom from tubercle. During the first septennial, 13·71 per cent of the total dead in Nairn fell from tuberculosis.

In the last septennial this percentage fell to 9·51, or a difference of 4·2 per cent. For the same periods Inverness shows 11·42 and 9·47 respectively, or a fall in the last septennial of 1·95 per cent. These are the only counties which can boast of a single figure percentage in this column. Aberdeen and Bute are the only other counties which show a reduction of over 4 per cent in this rate in the 21 years.

It is with sorrow that I find our beautiful Selkirk again showing herself sanitarily ugly. She ranges in tubercular death far ahead of any other county, no less than 18·36 per cent being her average rate during the last septennial from tubercular disease. This rate of death is 2·36 *more* than she was burdened with from 1855 to 1861. Her position both in respect of zymotic and tubercular disease and death demands, in my opinion, enquiry on the part of our central authorities into her condition, and as to the causes which are at the root of such an unfortunate state of affairs.

Now, Gentlemen, what conclusion can we come to as we glance along those almost parallel dotted lines? Is it not this, that since registration began in 1855 down to the year 1888, so far as tubercular disease is concerned, sanitation, as at present supported by law, has been, comparatively speaking, a failure. The general health has improved, but proportionally tuberculosis has not been grappled with. In some counties we certainly can show that among a hundred graves, two or three less were filled by consumptives during the last than during the first septennial, but for all Scotland the national graveyard contains in the last septennial only 166 tubercular victims less per 10,000 of the departed than it did in the first. We are not satisfied to call this progress, and less so than ever since Koch in 1881 discovered and demonstrated the immediate cause of tuberculosis.

The second premise of my thesis—viz.: "that tuberculosis is communicable from man to man and from the lower animals to man," is not, unfortunately, capable of such complete demonstration as the first. We cannot, unhappily, draw a diagram which would show conclusively that that number of men or women fell victims to the dread bacillus from breathing contaminated dust, or eating infected food, or drinking inoculated milk, nor (2)

are our scientific experts agreed among themselves upon certain points connected with the inception of this baleful disease, but now we do know that a specific bacillus does exist as the direct cause of tubercle, and most of us believe that dwelling under certain conditions, and eating and drinking food containing the spores or seeds of the tubercular germ will, in all probability, end in the consumptive's doom.

What do we mean when we say that our people are made phthisical by "dwelling under certain conditions?" We mean that this contagion, like that of several of the zymotics, is propagated, if not caused, by filth in the wrong place:—Filth in the home and its surroundings, filth on the person, filth in the air breathed, filth in the food and drink. By filth, we mean all matter, both general and specific, which tends to cause or breed disease.

Gentlemen, it sometimes appears to me cruel on the inhabitants of our land that tubercular disease, which yearly cuts off one-seventh of our dead, should be one of slow progress. If, upon its first entry into the human system, it were as keen and deadly in its course as small-pox or typhus fever, we would long ere this have been compelled to face boldly and resolutely the problem of its amelioration, if not of its extinction. But, alas! its progress is so insiduous and tardy that long before it becomes in the individual diagnoseable, or ends in his demise, we have lost all trace of the circumstances attending its causation. To us who cry aloud for free and abounding ventilation of workshops, factories, schools, and dwellings, it is galling to hear the sneering reply of the unbeliever—"Where is your proof that vitiated air is the direct cause of phthisis?" We seek to enforce the thorough subsoil drainage of an inhabited locality, believing strongly in Dr. Buchanan's evidence that this appears essential to the diminution of phthisis. Again, the infidels confront us with the words, "Theoretical nonsense." The poor unfortunates, within whose withering frames the fierce malady is burning, unlike the victims of enteric, typhus, or scarlet fever, can move freely about in society, scattering broadcast on floors, beds, in our public places—nay, around our very children, the deadly sputum which has been proved to have been full of

infectivity; here, again, we are helpless, and legislation is dumb. The flesh of the tuberculous ox, and the milk of consumptive cows are still surreptitiously vended among the people at imminent risk to health, and only a few populous centres are armed with powers specific enough to grapple with the danger.

Gentlemen, we are still "conjecturing" as to whether these things are "channels of indirect and clandestine influence," through which in one decade a fortieth of our race arrive at "that bourne from which no traveller returns." I am afraid it is the case that in this matter we are yet wondering what to do. As an engineer, I do not hold myself as competent to judge upon this momentous question, but along with many other laymen, who are reading from time to time the widely diverging views of scientists and experimentalists, I feel that, if what some of the best of them say is true, the population under our care have grave reason for demanding instant remedial legislation. It was with eager expectancy that I read the London *Times'* report of Professor Burdon Sanderson's address in opening the discussion on "Tuberculosis." When I got to the end of this discussion I was still in a state of expectancy, for although the Professor came to the conclusion, as an individual, that "the creation of a systematized meat inspection, extending not only to the great towns, but over the whole country, was desirable, and that tuberculosis should be included in the schedule of the Contagious Diseases (Animals) Act"; and although other eminent investigators admitted the risk to the public of giving them the milk and the flesh of animals affected with tubercle, I found that the motion, which was gravely put and carried as the result of all this important discussion, was in these terms—"That the etiology of tubercular disease of early infancy, between three months and five years old, be *referred for discussion at the next Congress.*"

Gentlemen, this may mean much or it may mean little, but to the ordinary intellect, applying itself as best it may to the whole bent and meaning of this debate of the savants, it is certainly "caution large," if, indeed, it is not a discreet shirking of the whole matter.

Fortunately, as I believe, our Standing Committee on Sanitary Matters in the House of Commons, of which our President of

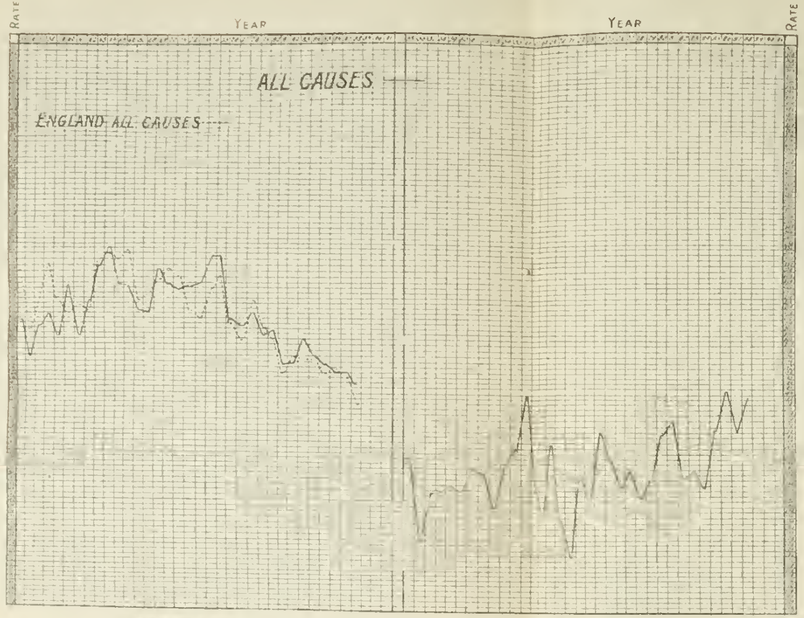
Congress, Dr. Farquharson, is a distinguished member, have the courage of their opinions, and have passed measures lately for Glasgow and Edinburgh, which enables these cities to guard their citizens in great degree from the consumption of beef and milk inoculated with the specific virus of tubercle.

Last year, before the Congress of this Association in Perth, Professor Hay attacked, in a lucid and most valuable paper, the impure air of many of our schools, and showed clearly how many of our children are in all likelihood done to death in close and ill-ventilated class-rooms. Your President of last year, Dr. Cameron, M.P., referred at the end of his able address to the smoke-laden condition of the atmosphere of our towns as the prime factor in lung disease; and again and again the fœtid air in the houses of the poor has been proved to be the destroyer of youthful life, and the cause of ultimate death in those who have passed into maturer years. But as yet we have no specific law as to the quality of a town's atmosphere, and a very imperfect law as to the production of smoke. We have no law as to the quality of air which must be supplied to our school children, nor have we any power to compel adequate ventilation in humble dwellings, which may not be stopped by the injudicious application of a bundle of rags by the ignorant householder.

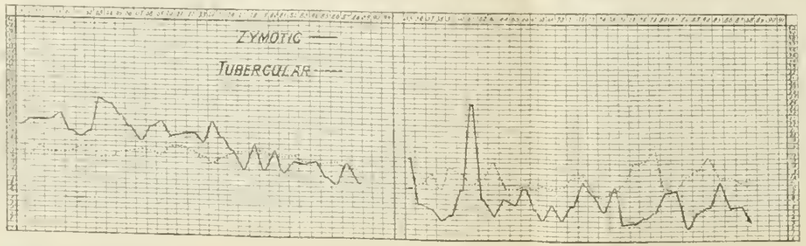
Subsoil drainage in a damp and low lying town or village site is in no way compulsory, and consumptive nurses may still, without let or hindrance, tend our young children, and spread around them unconsciously one of the many mantles of the destroying angel. The law is silent on those vital concerns. Who is to blame? Who, but the people themselves. They want teaching, they need warning, they require working up.

Gentlemen, this is your duty. Upon you, as the sanitarians of Scotland, aided by the public press, lies, first of all, the responsibility. When that responsibility is faithfully discharged, and the people of our country awake to a full knowledge of the "indirect and clandestine influences of filth" in its hydra-headed forms, we may rest assured our Government will, in the future as in the past, reach forth to us the helping hand.

SERIES OF DIAGRAMS SHOWING THE DEATH RATES FROM ALL CAUSES PER 10000 OF THE POPULATION IN SCOTLAND AND EACH OF HER COUNTIES SINCE 1855. AND ALSO THE PER CENTAGE OF ZYMOTIC AND TUBERCULAR DEATHS TO TOTAL DEATHS.



SCOTLAND



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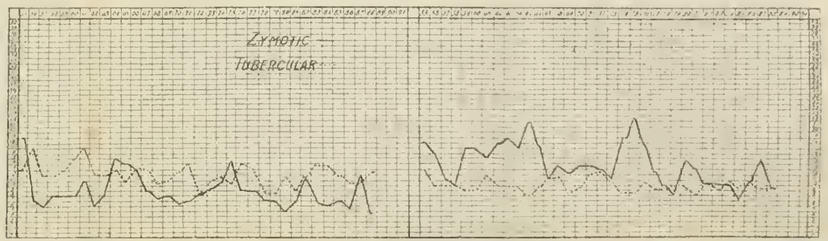

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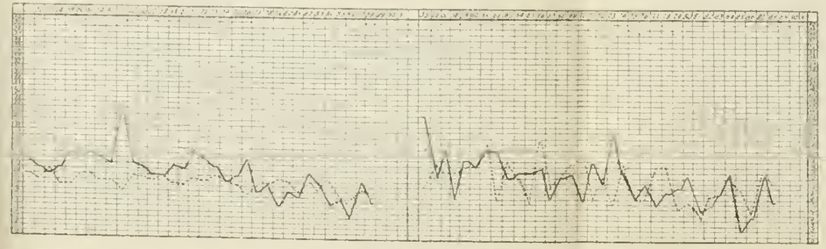
Series of Diagrams Showing the Death Rates from all Causes per 10000 of the Population in Scotland and each of her Counties since 1855. and also the per centage of Zymotic and Tubercular Deaths to Total Deaths.

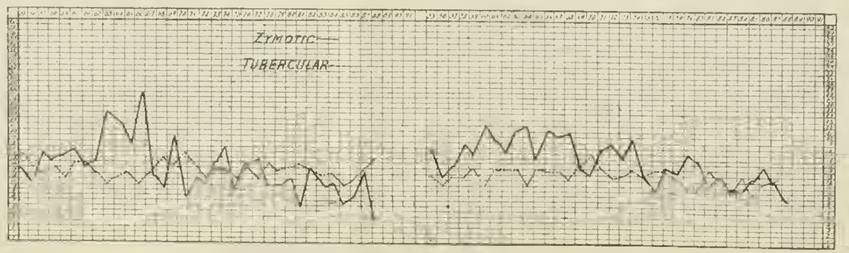
Inverness

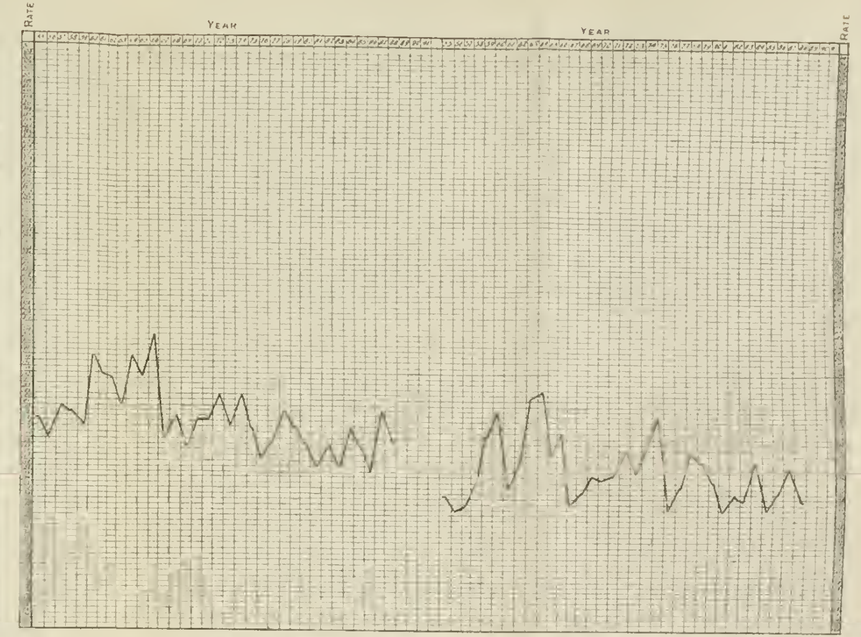


Nairn

Elgin

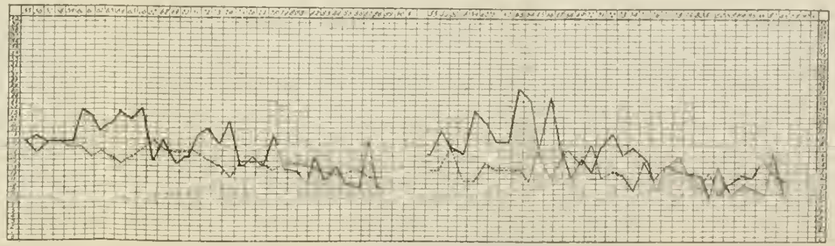
Banff





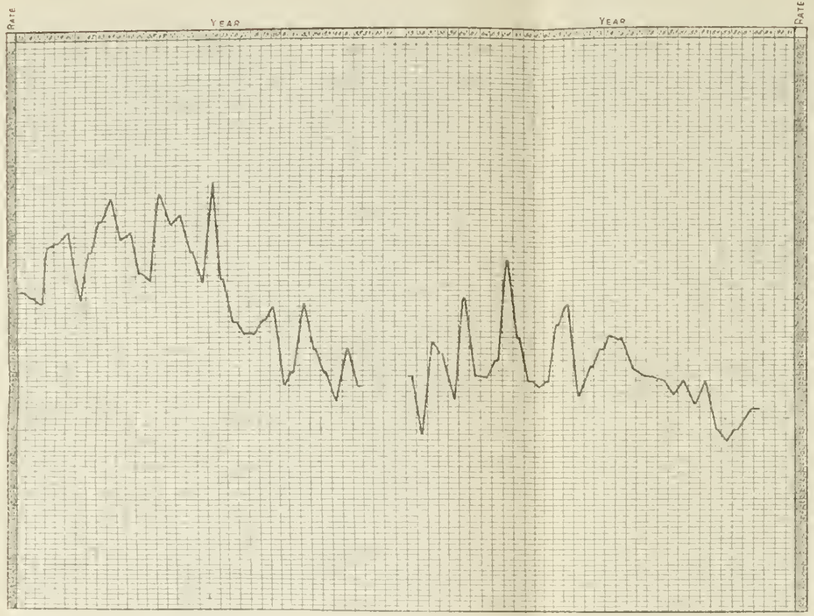
Aberdeen

Kincardine

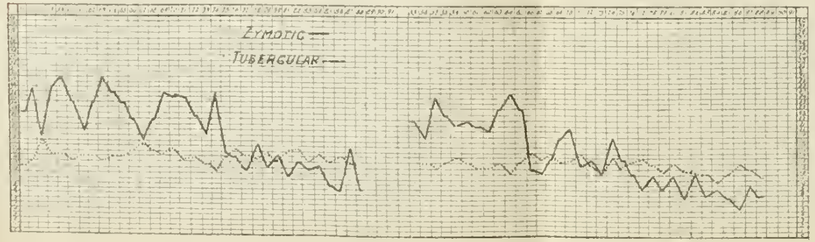


DAVID V WYLLIE ARCHITECT, 95 BATH ST

Series of Diagrams Showing the Death Rates from all Causes per 10000 of the Population in Scotland and each of her Counties since 1855. and also the per centage of Zymotic and Tubercular Deaths to Total Deaths.

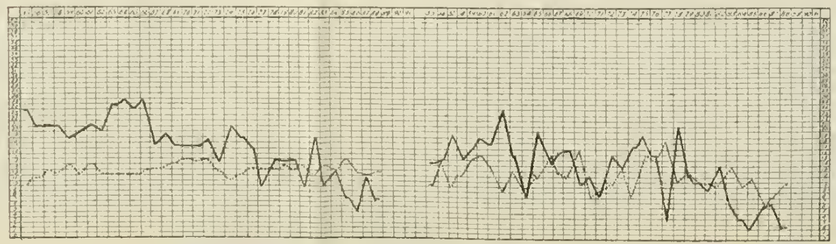


Forfar

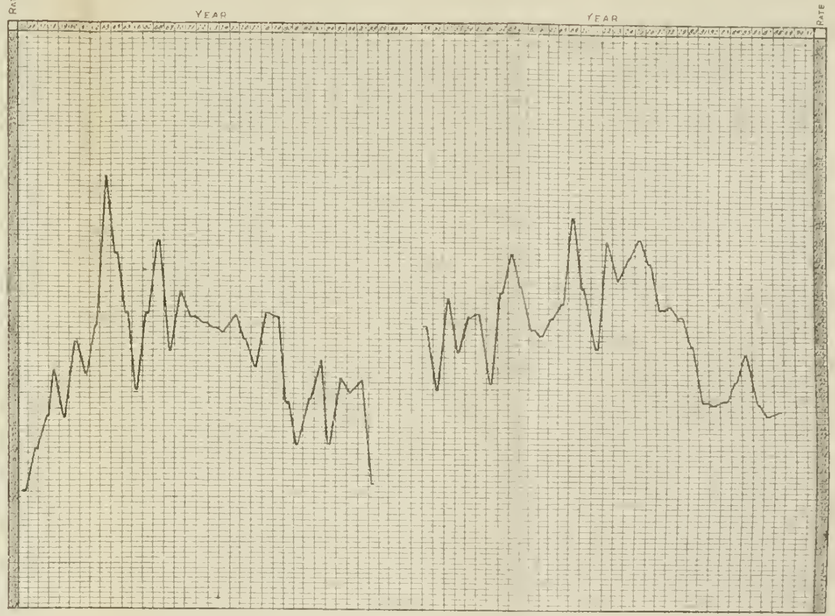


Perth

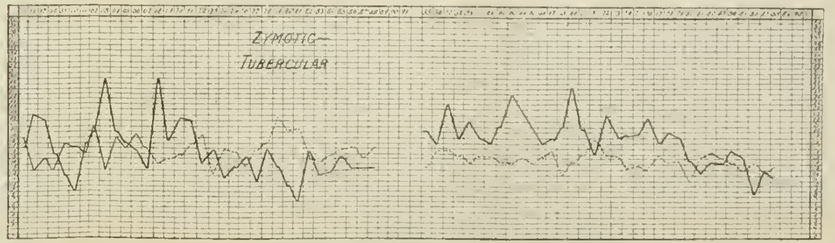
Fife



Kinross



Clackmannan



Stirling

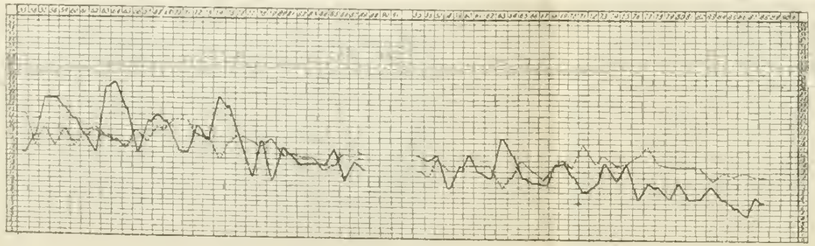
DAVID V WILLIE ARCHITECT, 95 BATH ST

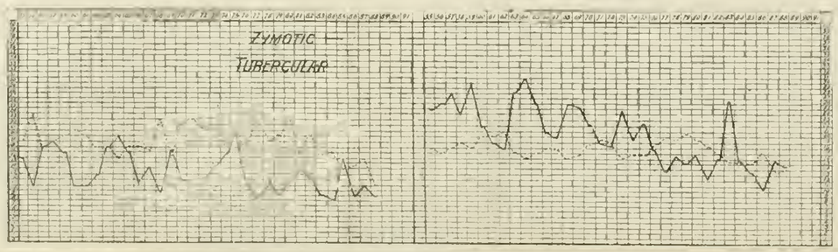
SERIES OF DIAGRAMS SHOWING THE DEATH RATES FROM ALL CAUSES PER 10000 OF THE POPULATION IN SCOTLAND AND EACH OF HER COUNTIES SINCE 1855. AND ALSO THE PER CENTAGE OF ZYMOTIC AND TUBERCULAR DEATHS TO TOTAL DEATHS.

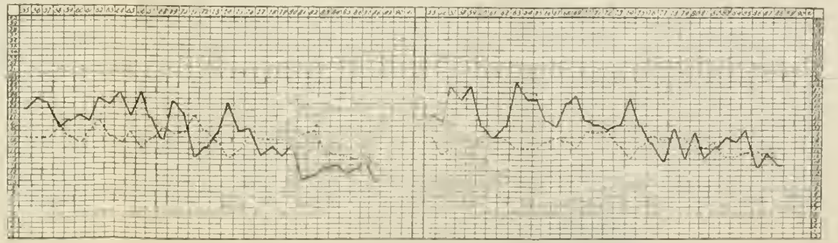
DUMBARTON ARGYLE

BUTE RENFREW

AYR LANARK

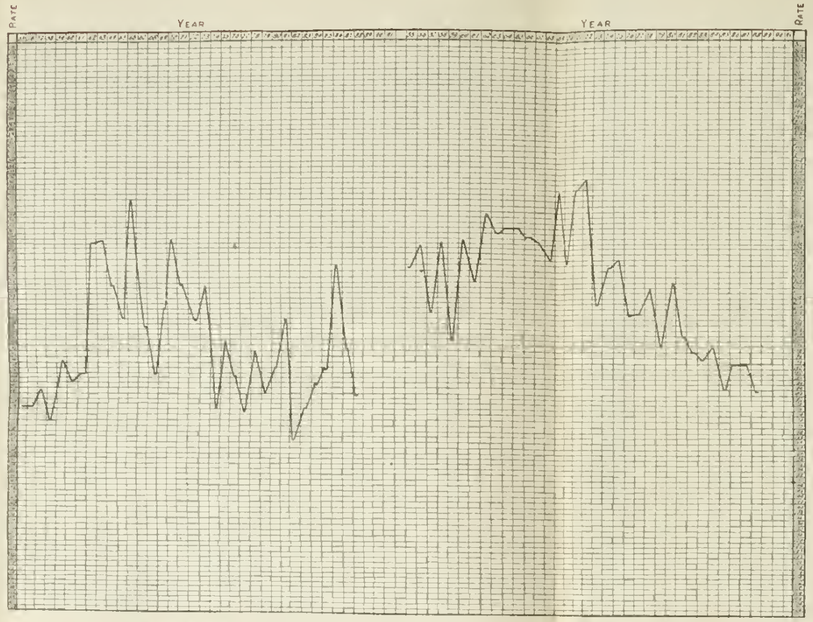






DAVID V WYLLIE ARCHITECT 95 BATH ST

SERIES OF DIAGRAMS SHOWING THE DEATH RATES FROM ALL CAUSES PER 10000 OF THE POPULATION IN SCOTLAND AND EACH OF HER COUNTIES SINCE 1855. AND ALSO THE PER CENTAGE OF ZYMOTIC AND TUBERCULAR DEATHS TO TOTAL DEATHS.



LINLITHGOW

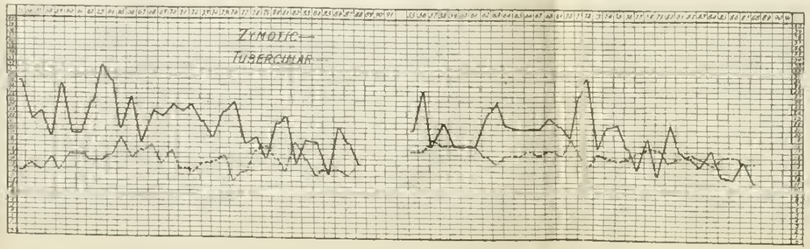
EDINBURGH

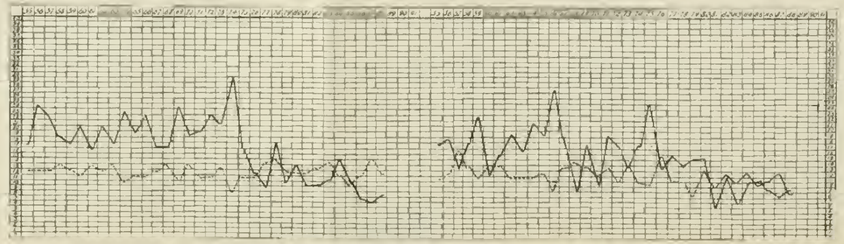
HADDINGTON

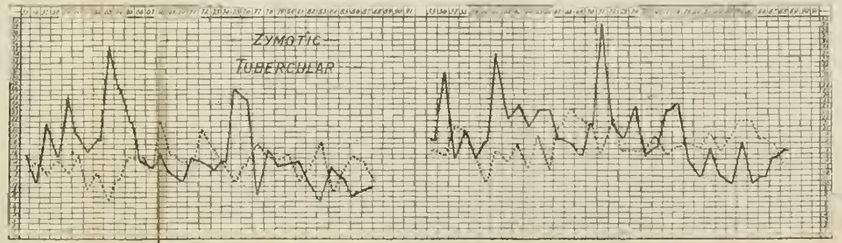
BERWICK

PEEBLES

SELKIRK







DAVID V WYLLIE ARCHITECT 93 BATH ST

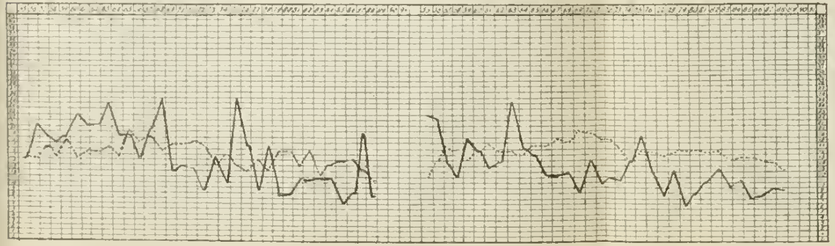
Series of Diagrams Showing the Death Rates from all Causes per 10.000 of the Population in Scotland and each of her Counties since 1855. and also the per centage of Zymotic and Tubercular Deaths to Total Deaths.

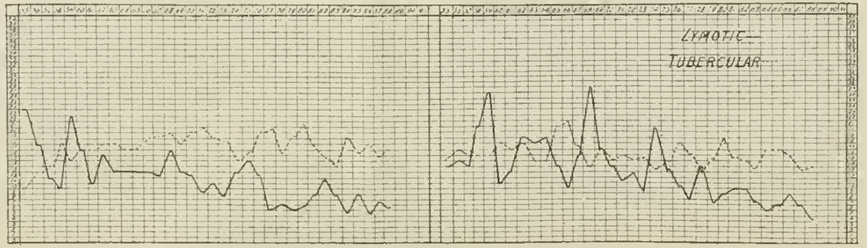
ROXBURGH

KIRKCUDBRIGHT

DUMFRIES

WIGTOWN





DAVID V WYLLIE ARCHITECT. 95 BATH ST

TABLE Showing the Average Mortality and Death Rates in the Counties for two Septennials 1855-61 & 1882-88.

	1855 To 1861			1882 To 1888		
	All Causes Rate Per 10000	Zymotic Rate Per 1000 Deaths	Tubercular Rate Per 1000 Deaths	All Causes Rate Per 10000	Zymotic Rate Per 1000 Deaths	Tubercular Rate Per 1000 Deaths
Scotland	207·28	21 28	16 14	192 85	13·16	14 48
Selkirk	131·14	21 57	16	8 159	13 13	18·36
Orkney	138·43	11·43	13	2 144 57	5·74	11·78
Shetland	146·28	10·57	11·71	10 164·71	6·11	12·91
Caithness	147·14	18	13	12 165·14	8·21	11
Peebles	149·28	17 43	12·57	1 141 43	9·54	13 23
Berwick	151·71	16·28	12·71	4 151	9 57	11 11
Ross & Cromarty	152·86	14·86	10 42	5 153·57	10 51	9 88
Inverness	153·57	14·14	11·42	13 166 42	9·54	9·47
Kincardine	155·42	19	13 14	3 150 43	10 46	11·24
Sutherland	157·57	9·57	14 14	7 158 71	7 5	12 11
Argyle	161	14·28	13·42	15 168·86	7 67	12·54
Elgin	164	14·57	14 14	17 170·42	9·57	12·94
Kinross	164·56	15·28	12·42	16 170	6·31	10 2
Banff	168·85	17	12·26	9 164·14	11·36	11·26
Clackmann	174·71	16·71	15 85	22 176	13·78	15 84
Haddington	177·14	19	12·14	16 158·28	9·4	12 06
Roxburgh	177·42	19·42	15·86	20 174·57	10·84	13·71
Wigtown	177·71	16 4	16·42	23 178·71	7 47	15·17
Fife	179·14	21	12·14	19 173·71	10·84	12·16
Nairn	179·57	15·14	13·71	11 165·14	8 1	9·51
Kirkcudbright	180·57	16 42	14·86	20 175 71	7·8	16·51
Aberdeen	182·	19 71	17	11 166 86	12·44	12 37
Linlithgow	182·42	22·71	13·28	26 189 43	16 17	13 3
Dumfries	190	16·71	15·14	28 190 85	10 07	14 14
Perth	190·71	18·85	13 85	18 173·3	8·46	12·23
Stirling	200	20·14	14 85	25 179 86	13 33	14·11
Bute	201·86	14·71	20·14	31 203·85	10·73	15 64
Dumbarton	205·71	21 71	19	24 179·3	14 66	14·94
Ayr	211	23 28	19 28	27 190·57	13·1	16·23
Forfar	226·71	24·71	14·71	30 193 43	12·01	14 64
Edinburgh	228·28	19 42	16·86	29 192·57	13·31	14 63
Renfrew	260·86	24·86	18·57	32 217 43	16 4	15 47
Lanark	265·86	23·86	17·57	33 224 14	16·84	16 01

TABLE Showing the Population:-Mortality Per 10,000:- and Death Rate per Cent from Zymotic & Tubercular Disease in Scotland & her Counties from 1855 TO 1888.

	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891
SCOTLAND	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS	DEATHS
	POPULATION	2,962,300	2,972,855	2,992,210	3,011,565	3,030,921	3,050,277	3,069,633	3,089,591	3,112,533	3,135,476	3,158,418	3,181,361	3,204,303	3,227,246	3,250,188	3,273,131	3,296,073	3,319,016	3,341,958	3,364,901	3,387,843	3,410,786	3,433,728	3,456,671	3,479,613	3,502,556	3,525,498	3,548,441	3,571,383	3,594,326	3,617,268	3,640,211	3,663,153	3,686,096	3,709,038	3,731,981	3,754,923
	ALL CAUSES	62,006	62,720	63,435	64,149	64,863	65,578	66,292	67,006	67,721	68,435	69,150	69,864	70,578	71,293	72,007	72,722	73,436	74,150	74,865	75,579	76,294	77,008	77,722	78,437	79,151	79,866	80,580	81,294	82,009	82,723	83,438	84,152	84,866	85,581	86,295	87,010	87,724
	ZYMOTIC	13,121	13,233	13,345	13,457	13,569	13,681	13,793	13,905	14,017	14,129	14,241	14,353	14,465	14,577	14,689	14,801	14,913	15,025	15,137	15,249	15,361	15,473	15,585	15,697	15,809	15,921	16,033	16,145	16,257	16,369	16,481	16,593	16,705	16,817	16,929	17,041	17,153
	TUBERCULAR	9,009	9,117	9,225	9,333	9,441	9,549	9,657	9,765	9,873	9,981	10,089	10,197	10,305	10,413	10,521	10,629	10,737	10,845	10,953	11,061	11,169	11,277	11,385	11,493	11,601	11,709	11,817	11,925	12,033	12,141	12,249	12,357	12,465	12,573	12,681	12,789	12,897
SHETLAND	POPULATION	31,373	31,473	31,573	31,672	31,772	31,872	31,972	32,072	32,172	32,272	32,372	32,472	32,572	32,672	32,772	32,872	32,972	33,072	33,172	33,272	33,372	33,472	33,572	33,672	33,772	33,872	33,972	34,072	34,172	34,272	34,372	34,472	34,572	34,672	34,772	34,872	34,972
	ALL CAUSES	490	498	506	514	522	530	538	546	554	562	570	578	586	594	602	610	618	626	634	642	650	658	666	674	682	690	698	706	714	722	730	738	746	754	762	770	778
	ZYMOTIC	91	93	95	97	99	101	103	105	107	109	111	113	115	117	119	121	123	125	127	129	131	133	135	137	139	141	143	145	147	149	151	153	155	157	159	161	163
	TUBERCULAR	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
ORKNEY	POPULATION	31,337	31,825	32,313	32,113	32,201	32,301	32,401	32,512	32,600	32,059	31,517	30,975	30,433	29,892	29,350	28,808	28,266	27,725	27,183	26,641	26,100	25,558	25,016	24,474	23,933	23,391	22,849	22,308	21,766	21,224	20,682	20,141	19,599	19,057	18,516	17,974	17,432
	ALL CAUSES	359	364	369	364	369	374	379	384	389	394	399	404	409	414	419	424	429	434	439	444	449	454	459	464	469	474	479	484	489	494	499	504	509	514	519	524	529
	ZYMOTIC	38	39	40	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
	TUBERCULAR	23	24	25	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
CAITHNESS	POPULATION	67,465	69,986	72,507	72,230	72,954	73,678	74,402	75,126	75,850	76,574	77,298	78,022	78,746	79,470	80,194	80,918	81,642	82,366	83,090	83,814	84,538	85,262	85,986	86,710	87,434	88,158	88,882	89,606	90,330	91,054	91,778	92,502	93,226	93,950	94,674	95,398	96,122
	ALL CAUSES	1,386	1,411	1,436	1,411	1,436	1,461	1,486	1,511	1,536	1,561	1,586	1,611	1,636	1,661	1,686	1,711	1,736	1,761	1,786	1,811	1,836	1,861	1,886	1,911	1,936	1,961	1,986	2,011	2,036	2,061	2,086	2,111	2,136	2,161	2,186	2,211	2,236
	ZYMOTIC	372	378	384	378	384	390	396	402	408	414	420	426	432	438	444	450	456	462	468	474	480	486	492	498	504	510	516	522	528	534	540	546	552	558	564	570	576
	TUBERCULAR	88	89	91	89	91	93	95	97	99	101	103	105	107	109	111	113	115	117	119	121	123	125	127	129	131	133	135	137	139	141	143	145	147	149	151	153	155
SUTHERLAND	POPULATION	24,295	24,440	24,584	24,328	24,272	24,216	24,444	24,089	24,032	23,899	23,515	23,131	22,747	22,363	21,979	21,595	21,211	20,827	20,443	20,059	19,675	19,291	18,907	18,523	18,139	17,755	17,371	16,987	16,603	16,219	15,835	15,451	15,067	14,683	14,299	13,915	13,531
	ALL CAUSES	404	411	418	409	416	423	430	437	444	451	458	465	472	479	486	493	500	507	514	521	528	535	542	549	556	563	570	577	584	591	598	605	612	619	626	633	640
	ZYMOTIC	72	73	74	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
	TUBERCULAR	19	19	19	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
ROSS & CROMARTY	POPULATION	83,241	83,106	82,971	82,836	82,701	82,566	82,394	82,256	82,122	82,328	82,295	82,262	82,229	82,196	82,163	82,129	82,096	82,063	82,030	81,997	81,964	81,931	81,898	81,864	81,831	81,798	81,765	81,732	81,699	81,666	81,633	81,599	81,566	81,533	81,500	81,467	81,434
	ALL CAUSES	1,361	1,383	1,405	1,383	1,405	1,427	1,449	1,471	1,493	1,515	1,537	1,559	1,581	1,603	1,625	1,647	1,669	1,691	1,713	1,735	1,757	1,779	1,801	1,823	1,845	1,867	1,889	1,911	1,933	1,955	1,977	1,999	2,021	2,043	2,065	2,087	2,109
	ZYMOTIC	172	175	178	175	178	181	184	187	190	193	196	199	202	205	208	211	214	217	220	223	226	229	232	235	238	241	244	247	250	253	256	259	262	265	268	271	274
	TUBERCULAR	42	43	44	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
INVERNESS	POPULATION	89,134	88,329	87,624	86,919	86,214	85,509	84,725	84,021	83,317	84,647	84,591	84,535	84,479	84,423	84,367	84,311	84,255	84,199	84,143	84,087	84,031	83,975	83,919	83,863	83,807	83,751	83,695	83,639	83,583	83,527	83,471	83,415	83,359	83,303	83,247	83,191	83,135
	ALL CAUSES	691	702	713	691	702	713	724	735	746	757	768	779	790	801	812	823	834	845	856	867	878	889	900	911	922	933	944	955	966	977	988	999	1,010	1,021	1,032	1,043	1,054
	ZYMOTIC	211	214	217	211	214	217	220	223	226	229	232	235	238	241	244	247	250	253	256	259	262	265	268	271	274	277	280	283	286	289	292	295	298	301	304	307	310
	TUBERCULAR	64	65	66	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97
NAIRN	POPULATION	8,184	8,211	8,238	8,265	8,292	8,319	8,353	8,380	8,407	8,434	8,357	8,359	8,363	8,366	8,368	8,370	8,372	8,376	8,379	8,382	8,385	8,388	8,391	8,394	8,397	8,400	8,403	8,406	8,409	8,412	8,415	8,418	8,421	8,424	8,427	8,430	8,433
	ALL CAUSES	126	130	134	130	134	138	142	146	150	154	158	162	166	170	174	178	182	186	190	194	198	202	206	210	214	218	222	226	230	234	238	242	246	250	254	258	262
	ZYMOTIC	29	30	31	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
	TUBERCULAR	12	12	13	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28
ELGIN	POPULATION	42,202	42,332	42,462	43,207	43,342	43,477	44,310	44,678	45,046	44,377	44,401	44,425	44,449	44,473	44,497	44,521	44,545	44,569	44,593	44,617	44,641	44,665	44,689	44,713	44,737	44,761	44,785	44,809	44,833	44,857	44,881	44,905	44,929	44,953	44,977	45,001	45,025
	ALL CAUSES	647	655	663	674	682	690	698	706	714	722	730	738	746	754	762	770	778	786	794	802	810	818	826	834	842	850	858	866	874	882	890	898	906	914	922	930	938
	ZYMOTIC	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
	TUBERCULAR	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137
BANFF	POPULATION	53,023	53,523	54,023	54,523	55,023	55,523	56,151	56,603	57,069	56,818	56,567	56,316	56,065	55,814	55,563	55,312	55,061	54,810	54,559	54,308	54,057	53,806	53,555	53,304	53,053	52,802	52,551	52,300	52,049	51,798	51,547	51,296	51,045	50,794	50,543	50,292	50,041
	ALL CAUSES	888	897	906	897	906	915	924	933	942	951	960	969	978	987	996	1,005	1,014	1,023	1,032	1,041	1,050	1,059	1,068	1,077	1,086	1,095	1,104	1,113	1,122	1,131	1,140	1,149	1,158	1,167	1,176	1,185	1,194
	ZYMOTIC	158	160	162	160	162	164	166	168	170	172	174	176	178	180	182	184	186	188	190	192	194	196	198	200	202	204	206	208	210	212	214	216	218	220	222	224	226
	TUBERCULAR	112	113	114	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146
ABERDEEN	POPULATION	217,418	218,406	219,394	220,382	221,370	222,358	223,591	224,579	225,567	230,028	232,569	235,110	237,651	240,192	242,733	245,274	247,815	250,356	252,897	255,438	257,979	260,520	263,061	265,602	268,143	270,684	273,225	275,766	278,307	280,848	283,389	285,930	288,471	291,012	293,553	296,094	298,635
	ALL CAUSES	3,862	3,720	3,578	3,981	3,949	3,917	3,866	3,814	3,763	4,301	4,335	4,369	4,403	4,437	4,471	4,505	4,539	4,573	4,607	4,641	4,675	4,709	4,743	4,777	4,811	4,845	4,879	4,913	4,947	4,981	5,015	5,049	5,083	5,117	5,151	5,185	5,219
	ZYMOTIC	692	718	696	719	692	718	725	752	779	858	885	912	939	966	993	1,020	1,047	1,074	1,101	1,128	1,155	1,182	1,209	1,236	1,263	1,290	1,317	1,344	1,371	1,398	1,425	1,452	1,479	1,506	1,533	1,560	1,587
	TUBERCULAR	716	743	769	796	822	849	875	902	928	955	981	1,008	1,034	1,061	1,087	1,114	1,140	1,167	1,193	1,220	1,246	1,273	1,299	1,326	1,352	1,379	1,405	1,432	1,458	1,485	1,511	1,538	1,564	1,591	1,617	1,644	1,670
KINCARDINE	POPULATION	34,907	34,899	34,891	34,883	34,875	34,867	34,852	34,844	34,836	34,876	34,907	34,939	34,970	35,002	35,033	35,065	35,097	35,128	35,160	35,207	35,223	35,280	35,316	35,353	35,389	35,426	35,465	37,025	37,777	37,933	38,089	38,245	38,401	38,557	38,713	38,869	39,025
	ALL CAUSES	516	510	499	493	504	515	534	553	596	670	625	579	529	151	563	161	641	184	630	186	642	160	500	145	534	153	596	170	625	179	529	151	563	161	641	184	630
	ZYMOTIC	83	81	79	78	80	82	85	88	95	107	100	92	84	13	90	14	102	29	101	29	103	23	80	23	85	24	95	27	100	28	84	24	90	26	102	29	101
	TUBERCULAR	69	68	66	65	67	69	71	73	79	89	83	77	70	11	75	12	85	24	84	24	86	19	67	19	71	20	79	22	83	23	70	20	75	21	85	24	84
FORFAR	POPULATION	198,880	200,192	201,504	202,816	204,128	205,440	207,017	208,369	209,721	216,740	220,760	224,780	228,800	232,820	236,840	240,860	244,880	248,900	252,920	256,940	260,960	264,980	269,000	273,020	277,040	281,060	285,080	289,100	293,120	297,140	301,160	305,180	309,200	313,220	317,240	321,260	325,280
	ALL CAUSES	4,377	4,236	4,095	4,236	4,095	4,236	4,377	4,236	4,095	4,885	5,169	5,453	5,737	6,021	6,305	6,589	6,873	7,157	7,441	7,725	8,009	8,293	8,577	8,861	9,145	9,429	9,713	9,997	10,281	10,565	10,849	11,133	11,417	11,701	11,985	12,269	12,553
	ZYMOTIC	1,010	1,042	1,074	1,042	1,074	1,106	1,138	1,170	1,202	1,234	1,266	1,298	1,330	1,362	1,394	1,426	1,458	1,490	1,522	1,554	1,586	1,618	1,650	1,682	1,714	1,746	1,778	1,810	1,842	1,874	1,906	1,938	1,970	2,002	2,034	2,066	2,098
	TUBERCULAR	573	573	644	715	777	848	919	990	1,061	1,132	1,203	1,274	1,345	1,416	1,487	1,558	1,629	1,700	1,771	1,842	1,913	1,984	2,055	2,126	2,197	2,268	2,339	2,410	2,481	2,552	2,623	2,694	2,765	2,836	2,907	2,978	3,049
PERTH	POPULATION	135,061	134,750	134,439	133,817	133,506	133,094	132,677	132,260	131,803	131,338	130,873	130,408	129,943	129,478	129,013	128,548	128,083	127,618	127,153	126,688	126,223	125,758	125,293	124,828	124,363	123,898	123,433	122,968	122,503	122,038	121,573	121,108	120,643	120,178	119,713	119,248	118,783
	ALL CAUSES	2,588	2,482	2,376	2,482	2,376	2,482	2,588	2,482	2,376	2,886	3,054	3,222	3,390	3,558	3,726	3,894	4,062	4,230	4,398	4,566	4,734	4,902	5,070	5,238	5,406	5,574	5,742	5,910	6,078	6,246	6,414	6,582	6,750	6,918	7,086	7,254	7,422
	ZYMOTIC	485	460	435	460	435	460	485	460	435	499	528	557	586	615	644	673	702	731	760	789	818	847	876	905	934	963	992	1,021	1,050	1,079	1,108	1,137	1,166	1,195	1,224	1,253	1,282
	TUBERCULAR	335	320	305	320	305	320	335	320	305	358	379	400	421	442	463	484	505	526	547	568	589	610	631	652	673	694	715	736	757	778	799	820	841	862	883	904	925
FIFE	POPULATION	154,281	154,104	153,927	154,650	154,773	154,896	155,051	155,174	155,297	156,791	157,341	157,891	158,441	158,991	159,541	160,091	160,641	161,191	161,741	162,291	162,841	163,391	163,941	164,491	165,041	165,591	166,141	166,691	167,241	167,791	168,341	168,891	169,441	169,991	170,541	171,091	171,641
	ALL CAUSES	2,735	2,717	2,587	2,867	2,869	2,869	2,694	2,694	2,665	2,988	3,010	3,032	3,054	3,076	3,098	3,120	3,142	3,164	3,186	3,208	3,230	3,252	3,274	3,296	3,318	3,340	3,362	3,384	3,406	3,428	3,450	3,472	3,494	3,516	3,538	3,560	3,582
	ZYMOTIC	656	654	653	653	652	651	649	648	647	646	645	644	643	642	641	640	639	638	637	636	635	634	633	632	631	630	629	628	627	626	625	624	623	622	621	620	619
	TUBERCULAR	286	284	283	282	281	280	279	278	277	276	275	274	273	272	271	270	269	268	267	266	265	264	263	262	261	260	259	258	257	256	255	254	253	252	251	250	249
KINROSS	POPULATION	9,266	9,176	9,086	8,996	8,906	8,816	8,709	8,620	8,531	8,488	8,445	8,402	8,359	8,316	8,273	8,230	8,187	8,144	8,101	8,058	8,015	7,972	7,929	7,886	7,843	7,800	7,757	7,714	7,671	7,628	7,585	7,542	7,499	7,456	7,413	7,370	7,327
	ALL CAUSES	146	138	136	148	139	153	159	171	138	155	160	181	157	180	138	160	151	155	157	181	215	132	138	148	179	127	156	112	138	124	134	114	145	137	174	129	201
	ZYMOTIC	15	10	19	14	26	18	22	14	22	16	26	18	30	21	15	10	20	14	25	18	30	21	15	10	20	14	25	18	30	21	15	10	20	14	25	18	30
	TUBERCULAR	18	12	17	13	13	9	18	11	22	15	19	13	23	16	12	8	16	11	20	14	24	17	12	8	16	11	20	14	24	17	12	8	16	11	20	14	24
CLACKMANNAN	POPULATION	20,985	20,840	20,697	20,554	20,411	20,268	20,122	20,333	20,544	20,755	20,966	21,177	21,388	21,599	21,810	22,021	22,233	22,444	22,655	22,866	23,077	23,288	23,499	23,710	23,921	24,132	24,343	24,554	24,765	24,976	25,187	25,398	25,609	25,820	26,031	26,242	26,453
	ALL CAUSES	302	311	333	340	355	372	388	389	352	372	393	399	378	387	417	395	537	366	264	483	233	441	385	206	429	276	479	217	403	238	463	206	462	204	460	207	480
	ZYMOTIC	35	36	37	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
STIRLING	TUBERCULAR	58	59	60	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
	ALL CAUSES	1,768	1,802	1,836	1,818	1,856	1,894	1,932	1,970	2,008	2,046	2,084	2,122	2,160	2,198	2,236	2,274	2,312	2,350	2,388	2,426	2,464	2,502	2,540	2,578	2,616	2,654	2,692	2,730	2,768	2,806	2,844	2,882	2,920	2,958	2,996	3,034	3,072
	ZYMOTIC	360	367	374	367	374	381	388	395	402	409	416	423	430	437	444	451	458	465	472	479	486	493	500	507	514	521	528	535	542	549	556	563	570	577	584	591	598
	TUBERCULAR	226	230	234	230	234	238	242	246	250	254	258	262	266	270	274	278	282	286	290	294	298	302	306	310	314	318	322	326	330	334	338	342	346	350	354	358	362
DUNBARTON	POPULATION	29,839	30,375	30,911	31,291	32,007	32,723	33,439	34,155	34,871	35,567	36,263	36,959	37,655	38,351	39,047	39,743	40,439	41,135	41,831	42,527	43,223	43,919	44,615	45,311	46,007	46,703	47,399	48,095	48,791	49,487	50,183	50,879	51,575	52,271	52,967	53,663	54,359
	ALL CAUSES	974	995	945	987	1,091	1,195	1,109	1,215	1,321	1,427	1,533	1,639	1,745	1,851	1,957	2,063	2,169	2,275	2,381	2,487	2,593	2,699	2,805	2,911	3,017	3,123	3,229	3,335	3,441	3,547	3,653	3,759	3,865	3,971	4,077	4,183	4,289
	ZYMOTIC	156	159	152	158	175	192	177	194	211	228	245	262	279	296	313	330	347	364	381	398	415	432	449	466	483	500	517	534	551	568	585	602	619	636	653	670	687
	TUBERCULAR	78	80	76	79	88	97	89	98	107	116	125	134	143	152	161	170	179	188	197	206	215	224	233	242	251	260	269	278	287	296	305	314	323	332	341	350	359
ARGYLL	POPULATION	89,970	88,952	87,934	86,916	85,998	84,980	83,859	83,049	82,599	82,179	81,759	81,339	80,919	80,499	80,079	79,661	79,771	79,881	79,991	80,101	80,211	80,321	80,431	80,541	80,651	80,761	80,017	81,049	80,905	80,761	80,617	80,473	80,329	80,185	80,041	79,897	79,753
	ALL CAUSES	1,512	1,568	1,289	1,145	1,322	1,501	1,322	1,501	1,680	1,859	1,559	1,259	1,602	1,945	1,602	1,259	1,357	1,457	1,371	1,285	1,199	1,113	1,027	941	855	769	683	597	511	425	339	253	167	81	84	88	92
	ZYMOTIC	245	254	192	115	213	311	213	311	409	507	304	101	407	713	407	101	446	791	485	179	232	285	338	391	444	497	550	603	656	709	762	815	868	921	974	1,027	1,080
	TUBERCULAR	200	208	163	118	175	232	179	236	293	350	247	144	241	338	235	132	166	200	166	132	98	64	30	4	32	66	100	134	168	202	236	270	304	338	372	406	440
BUTE	POPULATION	16,496	16,468	16,440	16,412	16,384	16,356	16,331	16,376	16,421	16,642	16,507	16,373	16,638	16

THE POSTION OF SCOTLAND WITH REGARD TO CENTRAL SANITARY ADMINISTRATION.

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Gentlemen,—I am privileged in again addressing you as the President of our Association. From my heart I thank you for the high honour you have done me, and for the consideration and forbearance you have shown me during what I am afraid I must term my unworthy reign. I have to congratulate the Association on the appointment of Dr. Eben. Duncan as the succeeding President. That he will materially aid *us* to "advance our standards," and "set upon our foes," I have every confidence, and I am sure he will shed clear and new lights on sanitation, and show us "so many worlds, so much to do, so little done, such things to be."

I will to-day occupy your time for a few minutes with some thoughts on the position of central sanitary administration in Scotland, and endeavour to show the necessity for a reorganised central sanitary bureau having more satisfactory powers than our Board of Supervision at present possesses for dealing with careless authorities. I will leave to abler men the expounding of the deeper things of the future.

Nothing is more alluring to the speculative mind than to cast itself loose from the fixtures of the present, and, forgetting for the time the history of human failure, to conjure up in imagination a new moral and physical world, wherein the multiplex operations of nature's laws proceed along ideal lines uncomplicated by human offences. That such intellectual gymnastics serve a high and

valuable purpose I do not doubt, but I will content myself on a lower plane with lessons less recondite, but perhaps as useful. Last year I had the privilege of endeavouring to spread before you a panorama of the past. It exhibited Scotland in three aspects since her hygienic infancy. Thirty-six years have gone since 1855—years of effort, and pain, and much crying in vain, yet, withal, years of gradual advance in the saving of life and in the alleviation of distresses.

Still, I do not think our hygienic day is advanced much beyond the dawn. From the Stygian darkness of 1847, when (by the orders of the newly established Board of Health) pots of pitch and tar were lighted in every street and close—a vain burnt offering to the cholera fiend—down to the present is a period of forty-four years. Are we now in the broad day looking back upon the nightmares of these ignorant times, or are we still working and longing for the sunshine? In some senses we are both. The civilised world is now full of light as to the causal relations between physical pollution and physical maladies. All educated men and women are in this light, but its play is interrupted by so much overshadowing cloud that even to those with the clearest vision "life's chequered paths of joy and woe" are far from sure or safe. The highest and dearest of our nation, girt with all that tends to make life happy and secure, are struck down by zymotic disease. From the presence of the throne itself comes the bitter cry—"if preventable, why not prevented." What answer have we to such a cry? The cry is a natural and a righteous one, and it must be answered. What prevents the full use to every man of the sanitary light we most indubitably now possess? Why should the life progress of the best in the land be suddenly arrested, aye, even ended, by a preventable cause? It is indeed a trite remark that individual ignorance, or carelessness, or selfishness is at the very bottom of most preventable disease. This well known truth were painful enough if, in its bearing on humanity, it implicated those only who were ignorant, careless, or selfish. But this is not so. The relationships of man are, hygienically, of the most intimate character. We all may not suffer *for* our brother man, but we all do suffer *because of* him. The selfish and careless landlord may destroy his tenants, the dairy farmer his milk consumers, the butcher his customers, and

the citizen his fellows, through some transgression of the hygienic laws of nature.

The legislature has long ago recognised the ease with which the deadly gifts of disease are handed round and widely dispersed. Laws have accordingly been passed to repress and punish the two prime causes of nuisance—acts of selfishness and acts of carelessness in the individual—and so far as they go, and where they have been put in force, they have rendered real service to life and comfort.

Now, it has been said that "the common law itself is nothing else but reason"—that "reason is the life of the law." I think we may take this aphorism in regard to common law to apply in many sections of our sanitary law, but the aphorism entirely fails when the law's administration becomes the consideration. Where the law says, "Thou shalt not," the authorities often tacitly say, "Thou mayest;" and where it says "Thou shalt," they not infrequently say, "We may not." All have access to the benefits of common law, although even here it often proves "a sort of hocus-pocus science that smiles in yer face while it picks yer pockets." Yet one virtue of the common law is its independence of Local Authorities. Every citizen has individual rights, and is sheltered under its ægis. He can demand and instantly obtain its protection, although sometimes, in suing for his coat, he may unfortunately lose his waistcoat also. It is also true that the statutory public health law fails, in great measure, as a preventative of disease, in the *may be* character of some of its sections, and in the fact that there is too much voluntaryism surrounding its administration. The evils of extreme decentralisation are acutely apparent in almost every small town and village in the kingdom. If proof of this is required, we have only to peruse the reports of the Local Government Board Inspectors with regard to England, and our county officers' reports lately issued for Scotland. They are sad repetitions of the oft-told stories of contaminated water supplies, stagnating sewers, leaky house drains, damp dreary dwellings, dangerous dungsteads, want of hospitals, want of disinfecting machinery—in short, a compendious list of all the armoury of disease; and, in the midst of all, our good Prince standing and crying in the name of the nation at our National Hygienic Festival—"Why not prevented?" Gentlemen,

that cry should be taken up, and it should be amplified and reiterated until ultimate, but direct, responsibility for the public health is placed in Imperial hands, and Bumbledom is forced to do its duty or disappear.

I make bold to say that most of our present unsoundness is the direct result of a too minute Hygienic Home Rule. Does this assertion seem strange? Is not this minute and independent responsibility one of the first principles of modern progress? Has not Herbert Spencer railed at our grandmotherly legislation, and urged the beauty of encouraging more and more the freedom and responsibility of the individual? Yes. Let us grant to the fullest extent the beauty of individual progression in knowledge and in good, but let us face the fact fearlessly that, for the administration of sanitary legislation, what amounts practically to a full autonomy in the hands of an unwilling, careless, or impecunious Local Authority, is a delusion and a snare. The history of sanitation in the hands of many past Local Authorities is summed up in the words of Macintosh—"Faithful to their system, they remained in a wise (?) and masterly inactivity—a disciplined inaction."

The Royal Sanitary Commission which in 1869 sat under the Presidency of Sir Charles Adderley, after hearing the most extensive and varied evidence that the country could produce, issued an exhaustive report in which these pregnant words occur: "*Some external pressure and vigilance is, especially in rural districts, necessary to force local sanitary authorities into action.*" . . . "*It cannot be allowed that the health and strength of the people should suffer by their inaction.*" Every individual man-jack of such burghal and parochial bodies doubtless was proud to be a humble citizen of Britain, and rejoiced to think it "an empire on which the sun never sets;" but, on the other hand, he seemed to be continually haunted by the fear that it might become, through his action, one in which the tax-gatherer never goes to bed. I speak, of course, very much in the past tense, but the dread of that bogey-man, the tax-collector, is not past. It is fear of this functionary that prints in large letters the word "retrenchment" on the bills of some popular county and municipal candidates. The word "reform" is also "writ large" on their bills—a "cat-call" to catch the unthinking and unwary.

Gentlemen, it is difficult for sanitarians to seriously impress the unthinking with the importance of our work, but the meanest intellect understands the full import of a drain on his pocket. A drain to his dwelling is a different matter. In the City of Glasgow, where, perhaps, sanitary light and literature have been spread as liberally as anywhere, I know proprietors quite willing to live over open drain pipes rather than spend a few pounds to put them right. These are types of many throughout the country. If these, and such like, were the only martyrs in the great cause of retrenchment, little could be said. The theory of the "survival of the fittest" would soon work out a positive proof of its truthfulness upon them; but, as I said before, they are not the only sufferers, nor can it ever be so. Now, it cannot be denied that there are many governing corporate bodies, both here and in England, who are mere counterparts of such individuals. Set up to fulfil the law and give health and comfort to the people, such bodies miserably fail in both. The phrase, "A people's health is a people's wealth," is in their hands only a "sanctimonious theory," and they relegate to the inferno of faddists the enthusiasts who seek to put the theory in practice.

I am not here publicly going to name any of the local authorities which have so abused their power and privileges. Some of them are to be found in the Supplement to the Twentieth Annual Report of the Local Government Board, from page 41 to 156, and, so far as Scotland is concerned, in the various important reports lately issued by the medical and sanitary officers of the county and district councils.

In the former report matters are not minced by the various gentlemen who were sent to investigate into the prevalence of infectious diseases in the many localities they report upon. The attitude of their minds towards defaulting authorities is well expressed by Dr. Blaxall on page 55. Here he says—"The vacillation and incompetence of local administration deserve to be shown." This sentiment is well supplemented by a remark in Mr. Watson's report to the County Council of Aberdeen, to this effect:—"Local authorities should perform their own duty before calling upon owners of property to do theirs." Any one who takes the trouble to read the reports of the county

council officers in Scotland, is struck with the wonderful unanimity in them all with respect to the insufficiency of pure wholesome water to drink, the want of hospitals and disinfecting apparatus, the absence of any provision for scavenging, and the damp and unventilated state of the artizans' houses. All this is light with a vengeance. Verily,

> "A light to guide, a rod
> To check the erring, and reprove."

Now, how do we stand in Scotland, as compared with our sister country of England, as to the means of utilising this light, as to the means of checking the erring and applying the necessary reproofs? In 1869, when the Royal Sanitary Commission sat, England was, in respect of checking the erring, much in the position of Scotland in 1892.

The evidence of the Secretary of the Local Government Act Office, Tom Taylor, Esq., on the powers of the central authority over local bodies, was of immense benefit to English sanitation then.

Asked by the Chairman—"What is the inspecting power which you wish to have?" Mr. Taylor replied—"The power of examining into the working of the Acts, *systematically* and *regularly*, and of seeing that the Act is carried out, and how it is working; of seeing that the Local Authorities are doing their duty, and what is the effect of their execution of their duty on the health, or comfort, or improvement of the district." Further asked, "Would you, then, be in favour of having inspectors who, without any local complaint, should be continually making a circuit of the country?" he said, "I think something of that sort is wanted." Let us now glance for a moment, first, at the machinery within the reach of the two countries for impressing sad sanitary deficiencies upon the attention of the Government authorities; and, second, at the comparative powers of these high authorities to deal with vacillating and refractory local administrations.

In England, as you all know, the Local Government Board controls public health administration; in Scotland, the Board of Supervision. At the head of the English Department there is a right honourable gentleman, a member of the Government with a seat in the House of Commons. At the head of the

Board of Supervision there is an excellent chairman, but not immediately connected with the Government, and with no position in the Representative House.

On the staff of the English Department there are two principal secretaries, one of whom has a seat in Parliament, and eleven under and private secretaries, three of whom have seats in the House. The Scotch Department has *one secretary*, with no voice in Parliament.

The English Board has a most efficient staff of twelve medical inspectors, one engineering inspector, and the services of an expert in bacteriology. The Scottish Board has four inspecting officers under the Public Health Acts, whose powers in this direction are heavily handicapped by having imposed upon them the general superintendence of the relief of the poor. It has also part of the services of a medical officer at a cost of £200 per annum, which miserable £200 had actually to be screwed out of the then Lords of the Treasury by the continued application of the Board. It will be seen at once that the supervising service in Scotland is atomic, both in respect of influence, numbers, and capacity for public health work, compared with that in her more populous and wealthy neighbour.

It is true that Scotland is financially a much poorer country than England, contributing, as she does, only about 11 per cent of the total monies devoted to Local Government services, yet I am not satisfied that her individual citizens are obtaining even comparative justice, from the present state of things, in this particular matter of public health State administration.

Let us look for a moment at the proportion of revenue which, for 1891-92, it is estimated will be expended in England, Scotland, and Ireland for Local Government purposes—England, £6,068,000; Scotland, £731,000; and Ireland, £344,000. The estimated revenues for these purposes to be drawn from each country are—England, £6,186,000; Scotland, £703,000; Ireland, 254,000. Thus, of the £118,000 which England can spare, Scotland gets £28,000, and Ireland £90,000. In the year 1889-90 the Board of Supervision, with all the duties of Local Goverment upon it, received £29,374, while in the same year the Irish Local Government Board received £124,997. Can those figures be construed by the representatives of the Emerald

Isle as "another injustice to Ireland?" Just look with me at another side of the picture—viz., the total revenue contributed by the three kingdoms per head of the population. For the year 1891-92 it is estimated to be (taking the population as at the census of 1891)—England, £2, 13s. 6d.; Scotland, £2, 11s. 5d.; and Ireland, £1, 13s. 6d.

Here we find each person in Scotland contributing only 2s. 1d. per annum of revenue less than each person in England, and 17s. 11d. more than each person in Ireland, and yet she receives for the upkeep of her Local Government Board £130,112 per annum less than the English, and £95,623 per annum less than the Irish Local Government Board. In other words, our Irish friends pay in, per head, 35 per cent *less* for Local Government purposes than we do, and receive from the exchequer 325 per cent *more* on behalf of their administrative Board than Scotland does.

Gentlemen, these facts and figures speak for themselves, and it is for our Scotch Members of Parliament to ascertain as to the why and wherefore thereof. It is notorious that Scotland wants, and deserves, more influential and efficient machinery than she has had in the past for Local Government, and particularly for Public Health purposes, and her individual citizens are entitled to participate in the benefits of such machinery in direct proportion, not to the total sum she with her small population is able to subscribe towards the total revenue, but to the comparative sum per head she pays into the Exchequer. If this means she must abandon "home rule" theories, then let her abandon them rather than lose the value of a well organised and thoroughly equipped and efficient State health administration. If she cannot, from poverty, have an influential and properly equipped Local Government Board of her own, let her have a Board so affiliated to the English Local Government Board, or to some future State Health Department, as will secure to her the *undivided* services of experts in hygiene and sanitary engineering. It has been fashionable in some circles of late to cast cheap sneers at our Board of Supervision. For my part, I have to express my astonishment that the Board has in any measure got through the enormous work it required to face, with the very limited staff at its command and the financial resources

placed at its disposal. In criticising the work and progress of the Board of Supervision, we must not lose sight of these facts.

> "The mournful truth is everywhere confessed,
> Slow rises worth by poverty depressed."

But there are other reasons which have tended to destroy the usefulness and to bar the progress of our Board as a State institution working for the health of Scotland. This brings me to a brief consideration of the second comparison—viz., the powers of the Health Boards of the two countries to deal with vacillating and refractory local administrations.

The English Public Health Act, in Sections 299 to 302, gives power to the Local Government Board, after due enquiry, to order any negligent local authority to enter forthwith upon the work it requires done. If this order is not complied with, the Board may appoint a person having all the powers of the said local authority to carry out the necessary work, the expenses for such work being recoverable from the local authority in the law courts, in the form of a rate imposed on the ratepayers, and said rate may be collected by any person appointed by the Board. The Board have also power to borrow money for all such purposes from the Public Works Commissioners, and enforce the repayment of such borrowed capital by the local authority.

This looks a big power to possess; but since 1875 Parliament has again and again affirmed the soundness of this method of compulsion, and has put in the hands of local authorities themselves the same power against private individuals who refuse to obey their orders and remove nuisances. Let us now see the position of the Board of Supervision as a compulsitor on local authorities! Its position and powers in this respect are dealt with in Section 96, 97, and 98 of the Public Health (Scotland) Act. In each of these clauses of the statute the Board is hemmed in by an appeal to the law courts. It cannot, like the English Board, relieve the sufferers of flagrant neglect by immediately causing the necessary work to be proceeded with if its orders are disobeyed.

We are informed by the late Secretary of the Board, now the chairman, Dr. Skelton, that "the Board have in several instances made application to the court to compel a Local Authority to

perform their duty under the Act," but he also informs us "the Board take proceedings only in cases of considerable public importance, and where the evidence is fairly conclusive." I am not surprised at this attitude of the Board with respect to very many well grounded complaints, which cannot be said to be of "considerable public importance." That the Central Government Board in Scotland have to appear before a sheriff or a judge of the Court of Session, and show causes after the usual tedious, onerous, and expensive fashion, why certain necessary operations should be commenced by a health authority in pursuance of their duty, is to my mind ridiculous. At all events it is, as compared with English powers, an anachronism. Any two householders or sanitary inspector in Scotland is vested with similar powers, and the inference of course can be drawn that the Board of Supervision may be as arbitrary and unjust in their requirements as either of those. I cannot think there is the slightest possibility of this, and it is to be hoped that very soon the powers possessed by the Local Government Board shall be extended to the Scottish Board. We cannot rest content until our Board has equivalent powers, and along with those powers administrative machinery sufficient to fully utilise them.

Compulsion upon the people's elected representatives does not sound well, but we must remember compulsion upon the poorest in the land sounded as badly a century ago. The famous Earl of Chatham more than a hundred years ago, in the House of Commons, uttered this sentence—"The poorest man may in his cottage bid defiance to all the forces of the crown. It may be frail; its roof may shake; the wind may blow through it; the showers may enter, the rain may enter, but the king of England cannot enter! All his forces dare not cross the threshold of the ruined tenement." But the exigencies of advancing civilisation have wonderfully modified the extreme rights of the individual. The occupant of the ruined tenement may still be safe from the entry of the queen of the United Kingdom, but a "chiel," in the form of a sanitary inspector, may be found at any moment quietly taking "notes" between his but and his ben, for the purpose of ejecting him and his family for their own good. It has occurred to me that the ejectment of a few Local Authorities would be a good thing. It is a pity that "the frivolous work of

polished idleness" should be punished by inflicting upon may be innocent ratepayers the extra burden of legal expenses, and the extra cost of necessary works carried out under outside pressure by an independent authority.

If a refractory Local Authority persisted in refusing to do such things as were legally necessary for the health and comfort of their people, it seems to me a reasonable course for Government to disqualify and disband such authority, and order a fresh election of commissioners. If the new body were equally inert the community could be justly held responsible and be fined accordingly. Infectious and communicable diseases we may always have as our enemies; but to reduce their virulence on the people at large—to prevent them to an appreciable extent—Government must be prepared to deal, patiently, perhaps, but very firmly and stringently, with those local bodies which imagine that in warring against disease it is best to carry out a Fabian policy.

It is useless making laws which the managers will not exercise. When those in office come to feel that their full duty *must be done*, much money will be spent—but much preventable disease will be prevented. It is after all, in many instances, very much a question of expenditure in one of two forms—the one of money, the other of vitality. We sanitarians cry, with Tennyson—

> "Ring out old shapes of foul disease,
> Ring in the thousand years of peace."

We are constantly in our arguments caring less for the wealth of a community than for its health, believing, as we do, that the latter involves the former. The old challenge of the highwayman, "Your money or your life," is very much the cry of modern sanitation.

Spend money on healthy homes, good water, effective drainage, hospital accommodation, and an efficient sanitary service, and life is sweetened and prolonged. Save money and do without those things, and disease, always lurking, ready to spring, has every chance to attack and spread. Let me say, in closing, notwithstanding her comparative poverty—notwithstanding her administrative weakness—notwithstanding her legal disabilities, Scotland can show great advance in practical hygiene. But we

dare not rest. The future must also be advancement, or our future king will have cried in vain, "Why not prevented?"

In taking my leave of you as your president, I earnestly commend to your thoughtfulness and patriotism the sentiments I have now imperfectly expressed. It was Johnson who wrote "that the man is little to be envied whose patriotism would not gain force upon the plains of Marathon;" but the host of Darius marching upon Athens is but an imperfect illustration of the forces upon Scottish soil working day by day under your very eyes for the disablement and destruction of Scotland's children. Silently, yet steadfastly and surely, the operations of these enemies proceed. But secured as we are now by the protection of our positions from the assaults of ignorance and adverse interest, the time has now come when our convictions may have fuller play, and our sympathies a freer expression. The health of our countrymen is our special care, and in no cause upon earth can our patriotism yield nobler service than that of promoting their happiness and prolonging their lives.

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THE EDUCATION AND REGISTRATION OF SANITARY INSPECTORS.*

To the Provost and Town Council of the important town of Alloa we are indebted for this opportunity afforded to the Sanitary Inspectors' Association of Scotland to meet in conference and discuss those problems which immediately concern the comfort, vigour, and health of the people. The time is propitious; and with the time came the kind invitation from the capital of Clackmannanshire.

Men of the highest culture are advocating a course of popularised sanitation in our schools as one of the best means of raising in the future wholesome and cleanly generations of men and women. No conception as to the best means of raising the health standard could in useful purpose compete with this one; but meantime there are two barriers in the way of such a happy consummation. First, many of our schools, speaking generally, are object lessons of insanitation; and, secondly, the new race of sanitary schoolmasters is not yet in existence. I do not propose to dilate upon the first barrier. We may hear the Gospel preached in a barn and profit thereby; but to profitably educate a child in the first principles and all-important character of good ventilation and pure air in a stuffy schoolroom is like lecturing a beggar on the value of wealth. Sanitary inspectors sometimes are requested to take up and spread from house to house the propaganda of cleanliness by those who forget that the capacity for cleanliness is dependent on many things in and around a

* Read by Mr. Peter Fyfe, sanitary inspector, Glasgow, before the annual conference of the Sanitary Inspectors' Association of Scotland, held at Alloa, on 26th June, 1894.

home—which things are often unattainable in the said home, and cannot be obtained by any legal process.

Letting this pass, I wish to speak for a few minutes on the proposed new race of sanitary schoolmasters; and, with every desire to accept the position, for the sanitary inspectors of the country, of teachers to the children and the public of the new branch of science called "practical sanitation," I ask, who is to teach the teachers? A certain writer once said:

> Souls to souls can never teach
> What unto themselves was taught.

If I convert these lines into

> How can inspectors ever teach
> What they themselves were never taught?

the absurdity of the position becomes at once apparent. Yet that is the position of the men at the present day who are asked to inculcate into the minds of the people the elementary principles of health and the reasons for many sanitary requirements.

I am far from saying that the school of experience through which all have passed and the self-culture which hundreds of sanitary inspectors have practised do not go a long way in fitting them for their responsible posts. I say the public—the kingdom—is astonishingly well served considering the meagre opportunities afforded for their education; but I further say that in the last ten years sanitation has become so vital, its branches so numerous, and its application so minute, that the public have no justification in longer expecting the sanitary inspector "to grow" like Topsy. Until now the sanitary inspector has been the "Topsy" of sanitation. He has "growed." Some, nay, many of them have so far studied, or attended as they could the lectures which in some centres are delivered during the winter session, that they have passed a written examination on the subject, and can present a certificate of competency; but such is, at the best, but a poor preparation for the position the law gives to the inspector, and in view of the expectations of the

public as to his capacity in the rôle of sanitary teacher. We all know how the child can puzzle, by a simple direct question, the deepest theologian. So most sanitary inspectors have been puzzled by a few questions put by a person whose greatest delight is to ask the reason for his every demand. Hardly a day passes in my own experience in Glasgow in which I am not catechised by some one on whom a notice has been served as to the whys and wherefores of the demands made therein. This attitude of the property-owning public and others on whom our notices are served is quite a reasonable one, as, in giving remedies for the abatement of various nuisances, we have no distinct definite law or bye-law to guide us or them. Hence we have to reasonably explain why we ask so-and-so to be done, the law being silent. . . . We must be ready, quick, and clear with our reply, or our demands will end in failure or litigation. Glaring nuisances, which common-sense at once marks out as dangerous, give little or no trouble, need no education to distinguish, and require no elucidation; but many and various are the insidious enemies to health which only the carefully trained mind can detect and have removed by tact and explanation.

I said at the beginning of my remarks that the time was opportune for our meeting. At the present time Sir Walter Foster, M.P., the head of the health department of the English Local Government Board, has under his consideration a comprehensive scheme for the proper examination of persons who aspire to be sanitary public servants. The Sanitary Institute of England lately applied for a royal charter which, if granted, would practically have had the effect of placing that body, with regard to the education and examination of future sanitary inspectors, in a monopolising position far from desirable. It was opposed by other bodies of sanitarians and was defeated; and now Sir Walter is trying to scheme out a plan whereby the public will be guaranteed in a thorough and comprehensive examination uniform over the whole country. It will at once be apprehended that, if a national Board of Examiners be appointed and recognised by the Government,

an end will be put to various bodies of men, associating under high sounding titles, holding irresponsible examinations, and passing any candidates as may seem to them fit to occupy the important position of sanitary inspector. There is a great danger in such opposing sanitary organisations being allowed to grant certificates of competency. Even in University diplomas we had a sad example a year or two ago in Glasgow. There the University examination for the diploma of D.P.H. became so lax that the General Medical Council had to step in and reform the whole procedure in connection with this degree at that University. Naturally candidates will flock to that body which is most notorious for an easy pass. If competition in simplicity of subjects begins, all guarantee to the public is lost. This association has requested Sir Walter Foster to admit representations from it to the committee which will discuss the scheme when drafted, but up to the present no satisfactory reply has been received. The Sanitary Inspectors' Association of England, consisting of over a thousand members, also petitioned to be represented, but for some unexplained reason they were refused; and at their late annual conference, held under the auspices of the Mayor and Town Council of Nottingham, an important resolution was passed expressing regret at the action of the representative of the Government.

Now, gentlemen, what does all this portend? It means want of influence—want of power to have yourselves and your requests acknowledged in a suitable manner at head-quarters. The old aphorism comes home to us when we cogitate on these things, viz., knowledge is power. To obtain knowledge, adequate education is absolutely essential, and systematised education means the establishment of technical colleges throughout the country, with trained teachers and appliances, at moderate charges for the course. It means, in the second place, a unification of all sanitary inspectors' organisations, so arranged and legalised that the people will be safeguarded against the introduction to the public service of incompetent persons, and so that all local authorities may be assisted in a choice and approved selection from candidates who may present themselves for

the vacant sanitary inspectorships. I will deal with this question later on. Meantime let us consider what kind of education a prospective sanitary inspector requires.

In all circles of society, except the lowest, a young inexperienced medical practitioner is looked upon more or less as an experimenter on the human system both as regards medicine and surgery. The poor cannot help themselves, so the medical apprentice usually begins upon them, and through alternating successes and blunders he acquires the knowledge no university can bestow. But mentally abstract from our young doctor his university training, and place him amongst the people to learn his business coincident with the acquiring of his theory, and you have a prototype of the sanitary inspector of the past. He came from his bench, or his soldering bolt, or his trowel, and was launched upon a helpless public a full-blown sanitary official. To-day is not so utterly bad as yesterday. Examinations of a rudimentary type are held. No enquiry is made as to where or how present candidates have got crammed for the occasion. If by diligent reading at home, or by the coaching of a private teacher, or by attendance upon special classes and lectures, it matters not; be he a railway porter, an unemployed schoolmaster, or a bankrupt grocer, he is eligible for a pass, if he can answer satisfactorily eight or ten written questions and stand an oral examination—"satisfactorily" meaning usually the obtaining of fifty marks out of a hundred. This is the present position. Now, my contention is that this is not a satisfactory state of matters, either to the public or to the vocation.

Let us take up a few subjects upon which a satisfactory public officer ought to be well educated, looking to the requirements of the Local Govenment Board of England and the Board of Supervision in Scotland.

First. He is required to report both to his own Local Authority and to the Central Board as to the work done and requiring to be done within his district. Therefore he ought to be able to properly write the English language. At present there is no examination on this point.

Second. He is required to work specific laws and bye-laws of a most extensive and ramified character, and ought to understand exactly how far these laws can support him in every-day practice. There is no special education provided for him here, and the examinations on this large subject are and have been of the most perfunctory character.

Third. He is required to note all defects in sewerage, drainage, and plumber work, want of adequate ventilation, defective or contaminated water supplies, and generally the host of items which, in and around buildings of all kinds, come under the comprehensive term "nuisances," and point out the best way of effecting a remedy that will yield absolute security to the public. All this alone requires a systematic training, accompanied by practical illustrations, which is not generally available, and here again past examinations have but touched the fringe of the hundred and one subjects involved.

Fourth. He is empowered to inspect and seize diseased or unwholesome meat of whatever kind. For this vital duty he has no training and but little theoretical knowledge, and until he has been in actual harness for some years the public may, so far as the untried inspector is concerned, eat anything from measly pork to the carcase saturated with anthrax poison.

I could go on, but I forbear. The time is surely ripe for a sweeping change. The education of the eyes which are employed by the people to peer into the conditions which environ civilized life and detect and eliminate by means of a cultivated intelligence everything which is baleful to health is manifestly imperfect. And it would pay the country to help in the proper education of the future sanitary inspectors. It would pay in health and it would pay in pocket.

If the inspector has not the confidence of his board and the people generally, both the board and the people will be out of pocket. Litigation, perhaps the most expensive luxury of our times, will be one of the results, and unsafe compromise will on many occasions follow upon litigation. I plead therefore for public support to insure a first-class

special education for the coming race of sanitary officers. Let them be well armed with a knowledge of their business and I will guarantee to the central Government, to Local Authorities, and to the people alike, a saving both in health and public funds. Now, who is to have the direction of such an educational movement, and what are the best means to adopt in establishing in all our technical colleges a system of complete instruction in practical sanitation?

In looking over the Calendar of our excellent Glasgow and West of Scotland Technical College, I find that sanitation has no place in its day instruction, and consequently up to the present day there is no recognition of sanitation as an applied science nor any diploma offered to students who might wish to study it. Turning to the evening classes, I find there are fourteen subjects put down as deserving of acknowledgment and in which the award of a certificate is offered to successful students. I am going to name these latter as they appear on page 102 of the Calendar, so that you may judge how many of them are more important in the public interest than applied sanitation: mathematics and physics, chemistry, mechanical engineering, naval architecture, electrical engineering, architecture, building construction, mining, metallurgy, agriculture, chemical industries, textile industries, art industries, commerce. Looking on further, I find sanitation occupies the fourth place under the heading "building construction," which includes for a certificate a pass in (1) carpentry and joinery, (2) brickwork and masonry, (3) plumbing, and (4) sanitation.

Let me analyse a little, and try to ascertain how far the associated subjects of "carpentry and joinery, brickwork and masonry, and plumbing," as explained in the syllabus under these headings, are essential to a sanitary inspector. Recollect, failure to answer satisfactorily technical questions in any of these three would debar any purely sanitation student from an honours certificate. Under the first, the embryo sanitary inspector may be examined in bonds in brickwork and arches, the construction and details of timber and iron roofs up to 60 ft. span, on the various

methods of laying tiles, corrugated iron, sheet lead, zinc, copper on roofs, on built-up beams, girders, curved ribs, and the construction of travellers, on bricklayers' and masons' scaffolding, on riveting, formation of stairs, fire-proof floors, the making of cornices, arrises, and a host of other constructive details most useful to a builder, but useless from a public health point of view. Under the second, we have methods of seasoning and preserving wood, natures and properties of various woods, bevels, setting out rods, newel and geometrical stairs, hinges, centring for elliptical, parabolic, and pointed arches, groining, and other details of carpentry which have as much bearing on sanitary work as theology has on the practice of medicine. Even under the third heading, viz., plumbing, which is so closely allied to practical hygiene, the poor sanitary student has to grind up such subjects as solders and soldering, fluxes and soldering fluids, soldering bits, blowpipe work, brazing, the tools used in plumber work, their forms and uses, &c.; geometry as applied to plumbing, cutting out sheet lead, hot-water circulation and heating by steam, &c., all most desirable things to know, but not what a future sanitary inspector needs to know, and what, if known, he can never, as a health official, usefully apply in pursuance of his duty under the sanitary Acts of Parliament. Then, what ought to be taught he is not taught. I give you a few subjects he urgently needs but does not receive instruction in—infectious diseases, their recognition, course, and hygienic treatment; disinfection in all its phases, both in theory and in practice; the composition of all unadulterated foods and drugs; the characteristics of diseased and unwholesome carcases, meat, and food; the chemical testing of water for impurities; the distinctive diseases in cows and cattle generally; practical training in drain-testing and the use of the anemometer, thermometer, hydrometer, and lactometer; byres and farm sanitation and construction; air in its relation to health; smoke and its prevention; and a comprehensive knowledge of all existing sanitary law from the Public Health Act down to the Shop Hours Act passed last year. Sanitation is now a vast subject, and it

is alike unfair to sanitary students and to the people that it should any longer be tailed on to the technicalities of trades with which it has alliance only in their broader aspects.

Now, gentlemen, by what means are our future officials to be prepared for their work, and who is to shape the destiny of the vocation? It is obvious, from the interest taken in the matter of their examination by Sir Walter Foster that the Government has become alive to the present unsatisfactory state of affairs. What will be the outcome of the deliberations of the various delegates he has called together we cannot tell; all we know at present is: first, that consideration is being given to this important public question, and second, that the Associations of the Chief Sanitary Inspectors in England and Scotland have been debarred by Sir Walter Foster from sending any representatives to the conference which has been called to consider those things which most deeply affect them and those who are to come after them.

This leads me to the second part of my subject, viz., the registration of sanitary inspectors. I do not admit, of course, that, although the sanitary inspectors of the kingdom are not yet legally banded together into a strong and concrete body, they are not entitled to some representation on a committee gathered together to discuss their work, their education, and the examinations which in time to come are to regulate their supply to the various local authorities requiring such service. Many are the men presently in the vocation whose opinion and advice would be of advantage to any body of enquirers. Yet, it must be admitted, we at the present time experience a want of cohesion and consolidation. We also want funds in order to assist in establishing technical schools and lectures in practical sanitary work all over the country. We want legal status in order to be able to maintain adequate discipline among the various members. We need power to establish a register and prevent any man from palming himself off on the public and on their elected representatives as a qualified sanitary inspector. This is a power, which for a con-

siderable period now, has been possessed by the medical profession. There are quack doctors who are known to be quacks because their names are not on the medical register, and they are under legal penalties if they use distinctive letters after their names to deceive the public, and justly so in the public interest. No man is allowed to establish himself as a medical practitioner until he is legally licensed to do so. Are the public not requiring protection from quack sanitary inspectors? Most decidedly they are, says the critic, and they surely will obtain skilled service when the Government establishes a universal and equal examination of men who desire to enter the profession. Let us examine this belief for a moment and see if there is good ground for it. The first point to be considered is, will the Government undertake the establishment of a complete technical education of those who are to come up for examination? If not, who will? If nobody will undertake to make the tuition systematic and thorough, on what can the Government or any one else base a safe-guarding examination? Can they do it with satisfaction on a basis of private tuition? I say they cannot. To do so would only keep open the door for the advertising and omnipotent sanitary crammer. Can they do it with satisfaction on the basis of attendance upon a series of one session's lectures at the Sanitary Institute or any other Institute? Again I urge the impossibility of the task. Can they do it upon the basis of three or four sessions of night tuition under special teachers, coupled with a series of practical demonstrations in all branches of the subject each session? I believe they could, especially if the student be trained in one or other of the building trades or in civil engineering. Examinations based on such tuition would be real and worth the energy and time spent upon them, and the people would be assured in the services of capable and intelligent men. There is a well-known saying, "Heaven helps them who help themselves." Governments are in this respect something like Heaven. They help associations of individuals who earnestly are banded together

in a cause which is for the good of the common-wealth; and no cause within the confines of civilized life is more likely to bring help to any body of men than the cause of the common good.

If the Government sees no united effort being put forth by the great body of sanitary inspectors throughout the kingdom to band themselves together in the cause of the education and training of the men who are to succeed them, and generally no vital interest being taken in the establishment of training schools and technical appliances to deal with the practical side of public health, such Government naturally concludes that sanitary inspectors are not yet capable of helping themselves, and as naturally are inclined to take the opinions as to their needs, advancement, and status from such bodies as the "Sanitary Institute" and that newer godfather the "British Institute of Public Health."

Gentlemen, these are the days of corporate effort. Hitherto there has been too much of *individualism* among sanitary inspectors. Kept hard at it, and usually paid a salary barely sufficient to make ends meet, they have had little time and less cash to spend upon corporate existence. But I feel convinced that the period of the old five pounders has passed away. At our great meeting last year with our English brothers in Glasgow we had prescience of a brighter day. We saw a great city's welcome to the representatives of the English and Scottish inspectors, and to-day we behold our Scottish Association heartily received by one of Scotland's oldest and worthiest burghs. Our associate life has begun. Shortly I fully hope we shall be embraced in an honourable and close union with the Sanitary Inspectors' Association of England, composed of considerably over one thousand officers. When that day arrives, and when each inspector worthy of his position and name joins the ranks, when funds are procured, and when by sedulous untiring work we become strong and united, it will be, I anticipate, an easy matter to convince the Legislature that the public interest is so indissolubly bound up in the education, worth, and status of sanitary inspectors that an Act of registration for them will be passed.

Now, what, *inter alia*, would an Act of registration do for sanitary inspectors and for the people who employ them? First of all, let me explain very briefly what is meant by an Act of registration. The words "sanitary inspector," or, in former days, "inspector of nuisances," were legal words used in the Public Health Acts to mean an individual employed by any local authority to act in that capacity. But the Public Health Acts in no way define what kind of person this public official is to be. For all it says on the subject the office might be held by a woman; and, I regret to say, in certain burghs, where I have happened to sojourn, I have heard displeased ratepayers use most opprobrious epithets when speaking of sanitary inspectors, aye, and of much higher dignitaries, so we put little stress on this; but there is no denying the fact that so undefined are this officer's qualifications and status that all and sundry, from a country roadman to a head constable, have been appointed to the post. Something in the form of a man was put at the lowest figure into the position—a kind of sanitary "Aunt Sally," at which nuisance-haunted persons might chip their complaints. But the people got tired chipping where perseverance by no chance was rewarded by any hygienic or other cocoa-nut, and as time wore on and the Local Government (Scotland) Act appeared, the advance was so marked as to exhibit the fact that the Board of Supervision and the Government had realised the low point to which the office had fallen, and had determined to raise it. Since then the London Act of 1891 has been passed. It takes a further step in specifying that for this post a special man must be sought for, and such special man must possess a sanitary certificate such as is issued by the Sanitary Institute or other certifying body. This brings us to the point I want to get at. We have here in embryo the makings of a legal register—that is, a register so hall-marked by legal enactment that no individual who has not received such legalised certificate may offer himself to any local authority for the vacant post of sanitary inspector. A legalised register entitles certain persons who have evinced on examination special education and qualifications to use a

certain title or place certain letters after their names which it is not legal for other persons to use. Thereby they become known to all, and are generally recognised as experts in their vocation or profession. An Act of registration is the instrument which, along with other corporate advantages, confers this exclusive right on qualified individuals. At the present time I sometimes see the letters C.S.I., meaning "certified sanitary inspector," or "certified by the Sanitary Institute," placed after certain names. This is well; but there is nothing in law at present to prevent any sanitary coach from issuing certificates to his students, nor anything to prevent such from adding C.S.I. to their names also. So the letters C.S.I. are defenceless against fraud until an Act of registration has been obtained. This is obviously unfair to the man who has regularly studied and successfully passed a hard examination. But an Act of registration would do more than this. It would distinctly define who were entitled to appear before the recognised body of examiners. Not any fervent votary of Mnemosyne who had got tired of his own job and, by the aid of a powerful memory, had stuffed himself with theoretical sanitation would then be able, on six or eight months' notice, to offer himself. Eligibility for examination is as important as examination itself, as, after all, examiners can only see a certain distance when exploring the depth of a candidate's knowledge. So the vocation would become specialised and honoured in a way it is hopeless to expect it can be as matters stand at present. And the public would be great gainers by such an Act as is here dimly foreshadowed. They would be assured in the service of a solid body of experts for work, the success of which is admittedly of vital concern to all; they would feel safe in the knowledge that into their homes and about their surroundings they could call in men having a real and acknowledged hall-mark on them; they would know where to find a guaranteed man where now they don't know where to find him; they would respect and coincide where now, I regret to say, they often disparage and disagree.

We are thankful for the progress made. We see the road clear in front, and look upon the upward windings of

it with a full hope that some day soon the sanitary inspectors of this country will reach an open, well-defined space where they may fight the foes of health and vigour with better weapons than they have now, and in battalions properly safe-guarded against the entry of inexperience and ignorance. Till that time comes we cannot afford to wait in idleness. I appeal to every inspector in Scotland to give us his countenance and support. The times are getting ripe for vigorous movement—for strenuous endeavour; and so long as our Association is favoured by such encouragement as the good town of Alloa extends to-day we may confidently claim the ear and good wishes of the great majority of the people.

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THE PLUMBER: HIS PRESENT POSITION AND FUTURE PROSPECTS.

Some choose their callings by instinct; some come by their callings, as one does a fortune, by legacy; while others tumble into their callings by sheer accident. Thirty years ago the fatherless lad who had to settle the momentous question, "What shall I do to live?" felt himself stranded in doubt and perplexity. Technical colleges were practically non-existent. He could not try and then honourably or safely draw back. His position then was, and to some extent even now is, like that of the Prince of Morocco, the Prince of Arragon, and Signor Bassanio when the curtains of the ante-chamber were drawn, revealing the caskets of the fair Portia.

As her suitors stood before the three graven boxes of gold, silver, and lead, anxious, doubtful, fearful of their luck, so must the thoughtful boy feel when, under no pressure of instinct, unguided by a father's love, he comes to choose his trade. In the old days, his choice once made was irrevocable. The lad became an indentured apprentice, was bound by legal withes to his post, and, fit or unfit, he was in for five or seven years. Good and well was this system so long as the youth loved his labour—where he had found his vocation; bad and ill when his hands acquired no cunning, and his heart became the heart of a drudge. "The stickit minister" is not a sadder spectacle than the stickit joiner or the stickit plumber.

Nothing in the movement of plumbers towards national registration will serve civilisation better than those lectures

and the technical instruction which the association is pushing on so earnestly and so successfully. Technical instruction on a right basis means that any lad, dubious of his choice, may put forth his mind and hand for a season at a trade without committing his future. If such an one, upon trial, finds his mind and hand unfitted to plumb, he can and should leave plumbing to those who love it and can do it. I have often thought, as I saw a lad streaking my door panels with daubs of paint and heard his warblings, that if his painting were as good as his singing my door would be a marvel of beauty instead of a monstrosity in graining.

Having before me this broad idea, I noticed with some regret that at the end of December last Professor Garnett, as representing the Plumbers' Company of London, stated in a brief address that technical instruction in plumbing and kindred sciences in that city was strictly confined to those who were *already* members of the trade. This may do as a beginning, but surely technical tuition as one of its aims should seek to protect the trade from the entry to it of youths who have on trial no liking, no genius, for it, and, on the other hand, protect many a lad, before it is too late, from entering a business for which he has no natural aptitude, and in which there is no hope of his getting on. Every trade has its yearly number of victims. Compelled by force of circumstances, many a lad, from want of guidance in and knowledge of what he is doing, takes up his soldering bolt or his crosscut saw and wastes two or three valuable years of his life which would be more usefully employed in weighing out potatoes or carrying the nation's telegrams.

The present position of the plumber in Glasgow carries with it the performance of duties not easily mastered in their entirety, and responsibilities of the gravest import. His future prospects, as I see them, immensely enlarge the former, and consequently add seriously to the latter.

The lad with the soldering bolt in his hand apprehends but dimly the path before him. In anticipation of young plumbers bulking largely in my audience to-night, I

selected my subject, and will endeavour to open a vista within his daily environment through which may be seen, in a general way, not only the far-reaching and beneficent effects of his efforts now, but a vision of prospective fields of extended usefulness in all highly civilised centres of population.

As to Glasgow, while not behind in much that tends to fill civic life with vitality, comfort, and wealth, she is yet lagging in some enterprises which directly make for these desirable things. I know of no class of tradesmen more fitted to carry out the detail of the enterprises I have in my mind than her domestic engineers, known at present under the generic term, plumbers.

What is a plumber? The dictionaries state it thus—"One who works in lead: one who adjusts lead pipes and other apparatus for the conveyance of water." Does that definition of Johnson, Walker, and Webster cover you and your work? I trow not. The evolutionary processes of time, the necessities of the human race, have driven you all beyond water into sewage, steam, and air; beyond lead into iron, steel, and brass.

Perhaps I am wrong in saying you have all been so driven. In Greater Glasgow I find there are 239 master plumbers, employing among them, at the end of 1894, 1151 journeymen and 862 apprentices. I asked these 239 master plumbers three questions—

First. "Do you undertake steam and hot water heating in churches, hotels, and public buildings?"

Second. "Do you confine yourself to plumbing only?"

Third. "Are you prepared to lead the new hydraulic power into buildings, and, if necessary, connect it to hoisting plant and machinery?"

The following is a summary of the answers received:—

115 say they undertake steam and hot water heating;

124 confine themselves to plumbing pure and simple; and

200 state they are prepared to assist in the distribution of water in the city at a pressure of 1000 lbs. to the square inch.

Now, I maintain that the modern plumber must face

modern work, or stand aside and make way for a new class of municipal tradesmen in departments only divided by a very thin partition wall from that in which he was reared. I take it that the 124 masters who confine themselves and their employés to plumbing pure and simple represent the plumber of the dictionary *plus* sewage.

It may be argued by such that, to adequately supply cold and hot water in various fashions to suit the comfort and convenience of the citizens, and make suitable arrangements for the safe discharge of all sewage and liquid waste into the city's sewer, is a big duty—important enough and onerous enough to be considered the only and legitimate duty of the trade.

At the present time, with Lower Glasgow in its transition stage from privy to water-closet—from the sixth part of a sink and water tap to one for each family—there is much to be said for the attitude of the majority. Work is flowing and will flow in upon the plumbers of Glasgow on these lines for many years to come in increasing quantity. No one can say that this, the present peculiar function of the plumber, is not one of the most important in the municipal arena. All recognise the fact that, since the plumber came to add the extraction of sewage from the home to his first duty of supplying the pure water, he jumped from being a tradesman yielding comfort and convenience into the position of a health protector or a health destroyer. It is mainly on this latter ground that the protection of an Act of Parliament is being sought for your trade. The realisation is gradually dawning on the minds of men in authority that bad, careless, ignorant plumber-work not only involves discomfort, but may be death to the citizen. I know, from experience in my official position, that lives are yearly undermined and cut off through inefficient workmanship in pipes and drains. Many of these fatal blunderings are doubtless due to a trade competition in estimates *plus* an unsatisfactory plumbing law as to minimums beneath which no plumber should go, and, in my humble opinion, successive Governments are to blame for so long delaying to give heed to such an all-important matter. But many are also due to

sheer ignorance on the part of workmen entrusted with a job, and I think you will all agree with me that no individual should be entrusted with the conception and construction of work who cannot give evidence of a full knowledge of its principles and practice.

The present position of the plumber in this respect is admittedly unsatisfactory, and the Plumbers Registration Bill, now before Parliament, is the evidence that he feels it to be so. The London *Times*, in a leader on the subject at the close of 1889, seems to deprecate legislative interference with your trade. The writer admits fully the immense importance to the public of first-class and scientific plumber-work, but says that your seeking the authority and countenance of the State is a roundabout way of setting to work. He goes on to say—"It is a little difficult to understand what legislation can be required to give authority to such a body as the Plumbers' Company, or how the Company's authority, which, to its infinite credit, has spontaneously undertaken the work, could be enhanced by legislation. The certificate of the Plumbers' Company should be to the plumber, whether master or workman, what the Kew certificate is to a watch. . . . If a man wants his drains well laid and his pipes well plumbed, he should employ men to do the work who hold the certificate of the Plumbers' Company."

Now, all this looks plausible enough. It is the cosmic principle of natural selection applied to plumbing. But those who argue thus forget two things—first, that the vast proportion of the public have not the choosing of the plumber, and that he or they who do choose him too often consult the interests of the private purse rather than the interests of public health; second, that the general statute law of England and Scotland does not proclaim what satisfactory plumbing is, and consequently the proprietors, be they individuals, trusts, or syndicates, are within their legal rights in putting in the flimsiest job that money can buy so long as it will stand the smoke test, which, as all practical men know, gives a very transitory security.

But even presuming that the early future will bring the

sixty-two model byelaws lately passed by your united Congress in Inverness into active and universal application by process of law, there would still remain, in my opinion, the need for a State-protected register of the men who are accounted fit to fulfil the law. Not till then will the modern plumber be "regarded as the trusted friend of every house hold, instead of its deadly and most troublesome foe."

To-day plumbers are thought to be the myrmidons of landlords or house factors; they have good prospects, through the Registration Bill, of becoming on an early to-morrow independent men fighting all and equally in the great cause of public health.

I have only one regretful thought in contemplating this aspect of your future, and that is the possible abolition of the honourable office of the sanitary inspector so far as drainage is concerned.

But let me come back for a few minutes to that answer of the majority of master plumbers in Glasgow, viz., 'We confine ourselves to plumbing pure and simple"; and from this, their present position, I will try to show you, in the light of modern tendencies, that it involves the sacrifice by your trade of the name "domestic engineers," and all share in the functions which in time to come shall attach to that name. In this study I am conscious of appearing, so far as my native city is concerned, in the dangerous *rôle* of a prophet, and as "prophets have no honour in their own country" I am likely to meet with the orthodox fate. Nevertheless, I make bold to say that Glasgow in 1945 will warm herself, cook her food, and drive her motors by very different methods from those employed just now, and in these methods I am convinced the future plumber should have a predominant share. Even now warning voices are in the air. The daily envelopment of our city in her pall of smoke is calling forth the anxiety of our best citizens, and the cry is going forth for more rational methods of obtaining heat and power.

I am now going to draw your thoughts to what has actually been accomplished in the commercial capital of America, where our American cousins are solving one of

the problems of cities. In New York, in 1882, works were established to supply steam at a pressure of 80 lbs. per square inch to the citizens from central stations, as we get our gas and water at the present time.

Two main stations have been erected by the New York Steam Company capable of supplying high-pressure steam up to 19,000 horse power per hour. The main wrought-iron pipes from these stations extend through nearly eight miles of streets, yielding power to between 500 and 600 steam engines, but principally heat to public and private buildings. I cannot, in a lecture of this kind, enter upon technical details, but a few of the main facts will interest you, who may, if you choose, come to be the men who will assist in a similar distribution in this city of such a useful and beneficial power before many years have gone.

The large mains are welded wrought-iron pipes, 11, 13, 15, and 16 inches in diameter, while the small supply pipes from them to the houses, offices, and factories are the ordinary standard wrought-iron piping in daily use in your trade. The main pipes are laid in brick trenches, and are kept 4 inches from the sides of the trench. The trenches are asphalted, and the spaces between the pipes and the sides of the trench are packed with slag or mineral wool to prevent condensation. Over the pipes there is a covering or roof of 4-inch tarred planks bedded in cement. This roofing is covered by tarred paper carried down the trench walls to keep out water. All the branches from these mains, except those for very small steam supplies, are 3 inches in diameter, and are flanged. These branches are capable of supplying from 50 to 95 horse power When the system was first installed the condensed water was led into small return iron mains and taken back to the boilers at a temperature of 200° Fahr., but it was found that these pipes gave way under external corrosion, which proved extremely active at that temperature. The condensed water is therefore now mainly discharged into the public sewers. This is obviously a disadvantageous circumstance, both on account of the loss incurred by the

company, estimated at 10 per cent. of fuel, and also because the sewage in the sewers is thereby more rapidly decomposed, thus producing offensive putrefactive gases which will give offence in the streets. The superintendent, I understand, means to try return pipes made of brass, the expense of which he thinks would be fully met by the saving of the hot water.

Such, most briefly, is the main system of steam heating in New York, and by so much are the plumbers and heating engineers of that great city encouraged and assisted in supplying to her citizens one of the prime necessaries of life, namely, heat. Now, let us glance at the cost of such power and heat to the consumers. The company charge upon what is known as a "Kal." A "Kal" is equivalent to the heat necessary to produce 1110 thermal units, or otherwise to raise one pound of water from 100° into steam at 70 lbs. pressure to the square inch. When it has to be reckoned in horse power it has been found that there are 30 "Kals" in one indicated horse power. For a continuous supply of 30 "Kals," or one indicated horse power per hour, a charge of about ¾d. per hour is made, which for a working period of 3000 hours during the year amounts to £9 7s. 6d. Small users pay more, viz., £12 10s., and large users pay less, or £7 10s. In Glasgow these charges would be greatly reduced as both our fuel and our labour are much cheaper.

Coming to the cost of heating, we find the charge is about 9s. 6d. for each 1000 cubic feet of space heated during 182 days of the cold season at 24 hours per day. Of course, radiators may be placed in very different situations, and, owing to the exposure and draughts of cold air, may condense large quantities of steam. The maximum charged by this company, where such conditions have been found to exist, is 17s. 10d. per 1000 cubic feet for the season. As before stated, we could do it here much cheaper, and I do not think I am far out when I estimate that at two-thirds of this cost it could be made to pay in Glasgow. That is to say, one indicated horse power could be supplied for one halfpenny per hour, and 1000

cubic feet of space be efficiently warmed during 182 days at 24 hours per day on an average charge of 9s. 1d. for the season.

In order to give you an idea of the cost of heating by our open-fire system in the smaller houses of Glasgow, I took about 100 average one-apartment houses, 100 average two-apartment houses, and 100 average three-apartment houses in the north, east, south, and west of the city, and through my lady inspectors found that during the week beginning 18th December and ending on 24th December, 1894, the following was the average amount of coal burned in each class:—

One apartment, - - - -	1 cwt. 2 qrs. 20 lbs.
Two apartments, - - - -	2 cwts. 1 qr. 7 lbs.
Three apartments, - - -	2 cwts. 1 qr. 13 lbs.

This week was a mild one in respect of weather, and may be taken as an average week as to temperature during the 182 days of the cold season.

At these quantities we have the following as the expenditure for coals in the respective houses during 182 days.

	Tons	Cwts.	Qrs.	Lbs.		£	s.	d.
One apartment, -	2	3	2	16	at 8d. per cwt.,	1	9	1
Two apartments, -	3	0	0	14	,, ,,	2	0	1
Three apartments, -	3	1	2	0	,, ,,	2	1	0

Now, we may take it that a one-apartment house in Glasgow is equivalent to 1000 cubic feet of space, so you see the £1 9s. 1d. they expend for fuel is greatly in excess of even the highest charge of 17s. 10d. in New York for heating a similar space effectively for 24 hours per day. Yes! but then you say, what about cooking? Well, I see no reason why all cooking cannot be most effectively done by steam.

In our two latest Atlantic greyhounds—the "Campania" and the "Lucania"—all the roasting, stewing, and boiling are done in steam ovens supplied by a well-known Glasgow firm. In these steamships the steam from the boilers has a pressure of 160 lbs. per square inch. This is reduced for the roasting ovens to 90 lbs. pressure, and to between 5 and 10 lbs. for boiling. A joint of mutton,

6 lbs. in weight, is thoroughly cooked by 80 lbs. steam in $2\frac{1}{2}$ hours. There is little waste of steam occasioned by this process of cooking, and there is nothing against its free use in all humble homes except the first cost of the ovens and boiling pots and the want of steam. Given the steam at their doors, I am convinced the necessary apparatus would soon be forthcoming at moderate expense.

It may be objected that such a system would not give the full and free ventilation obtained by the open fire, and that, in any event, the want of the cheery heart-inspiring glow of the flaming coal would effectively debar the free use of steam radiators and steam cooking stoves. As to the former objection, it is true that the open fire is a powerful ventilator, but it is also true that in small houses it is one of the most powerful preventers of free ventilation. Anyone who has experience of these houses during the night watches knows the fœtid condition of the atmosphere in them, caused largely by the tenants carefully stopping up every crevice at window and door by which fresh air can enter. Almost all the heat from the open fire is rushing up the chimney, causing the exhaustion which produces the chilling draughts of cold air they seek to prevent. Hence not only is the vast proportion of the caloric in their fuel lost in the chimney flues, but that loss conduces to the absence of abundant fresh supplies reaching them during sleep from the outside. Such would be almost entirely obviated by causing the air during the night to pass through the steam radiators, and the chimneys would still continue, in a moderate but efficient way, to act as exhausters of the vitiated atmosphere. With regard to the latter objection, there is no doubt a pleasing phantasy induced by gazing on the glowing embers, but to those who only win their daily bread and nothing more, a loss to please the fancy is a loss indeed, and there can be no question that to obtain heat from an open fire is a most costly and extravagant way, only to be adopted when there is no other way of securing it. In these sanitary days we hear of sewer gas, filthy surroundings, and defective ventilation as breeders of

disease, carrying off their thousands of victims yearly, and huge sums have been and are being spent to minimise the effects of all such pestilential conditions; but what about the demon cold and his brother demon the fog? When these unheavenly twins visit our streets and alleys, as they have this winter, for a lengthened time, we see human life being blotted out as it were before our eyes in every part of the city.

When the severe cold came last month the death-rate rose from 23·9 in December up to 28·4 for January, a distinct jump in a few days of 4·5 per 1000 in our rate. This simply means that 261 persons died that month who would not, humanly speaking, have died under the conditions existing in December, almost solely caused by January's temperature being about 10 degrees under that of December. Frost is therefore seen to be an immediate destroyer of life in great cities, but when he is assisted by continued fog the loss of life and health becomes appalling. In the middle week of February the death-rate had mounted to 43 per 1000.

What causes fog but the smoke which comes from our open fires and our badly managed boiler furnaces? Even in London, where factories are not permitted to belch their deadly carbon into the air as they are here, you see recurrent fogs enveloping as a pall the vast city, claiming yearly its victims. What causes them but the smoke from the chimneys of her million household fires, mingling with the saturated air of her winter days? It is time, it seems to me, for capitalists or municipal authorities to look at this great question of central steam stations from this point of view alone, and I feel sure that in solving one of the municipal sanitary problems of the age they will also solve, in a most satisfactory manner to themselves financially, the economic problem of how to heat a great city on a better and cheaper basis than it is now heated.

Are the 115 master plumbers who state they are prepared to undertake steam heating in churches, hotels, and public buildings ready and able to serve the humblest citizen with a steam supply with comfort, economy, and

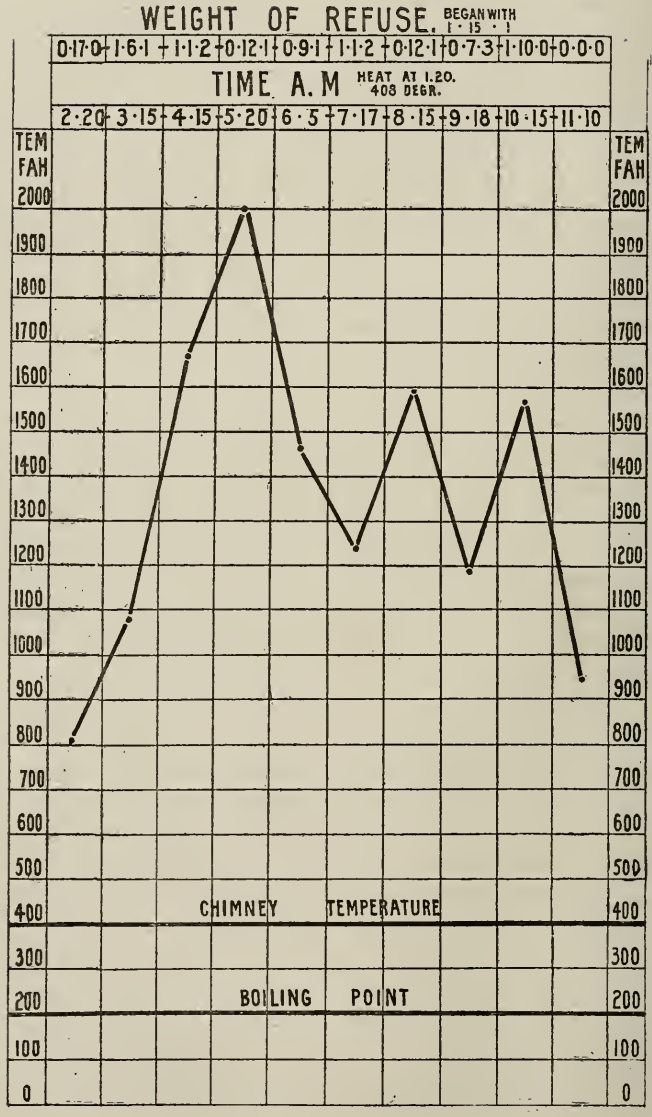
without danger if such a supply were laid at every door? Your brethren in New York have had to face it, and apparently have faced it successfully. It is not to be done nor thought of without serious study. Much opposition and popular prejudice will have to be overcome in such a revolutionary change. Nothing, no one is more conservative in such matters than the great democracy. In all reforms, in all radical changes, it is ever the same; and many minds who, looking ahead, can grasp the feasibility of such schemes in theory, shrink from attacking the problem in its varied details, shrink from incurring the obloquy attaching to possible primary failures. The New York Steam Company have had their failures. Mr. William Cawthorne Unwin, F.R.S., in one of his 1893 Howard Lectures, thus closes his account of the working of their system:—"The New York plant, in spite of some faults almost inevitable in a new enterprise, is running and yielding a large income. Many buildings would have their rental values materially lowered if the steam supply were cut off." It would, I think you will admit, be of signal importance to your trade and to the public generally if an object lesson upon a fair scale were given in this city by what is known throughout the kingdom as the most go-ahead corporation in it; and I now ask your indulgence while I refer for a few minutes to a waste, part of which could well be so utilised.

As most of you are aware, there are in Glasgow three main cleansing depots called refuse despatch works. After all is sold that can be sold from among the heterogeneous mass of stuff collected from the city every day, there is a residue known technically as "soft core," which, like the tares of the Scriptures, goes to the burning. On the average about 94 tons of this "soft core" is destroyed by fire in the furnaces every night, and the heat given off simply goes up gigantic chimneys 200 or 300 feet high. In 1883 I ventured to suggest to the late Mr. W. R. W. Smith, then chairman of the cleansing committee, through Mr. John Young, my then superior officer, that this was a gross waste of valuable power, and I observe

from a paper Mr. Young read in that year to the congress of the Sanitary Institute held in Glasgow, that the committee on cleansing had before them in a formal manner the question of utilising the surplus fuel in raising steam for electric lighting purposes, and that a special committee was appointed to report on the subject. I never saw their report, and, at anyrate, nothing was done, nor, so far as I am aware, were any scientific experiments carried out to test the waste in these destructor furnaces. I therefore, two months ago, spoke to Councillor Crawford on the subject, and he at once fell in with the notion of having the subject gone into. I borrowed a Siemens' water pyrometer, which the Steel Company of Scotland kindly lent me. Armed with this instrument I, along with my assistant, Mr. Dewar, began operations on the night of the 24th January at the despatch works at Kelvinhaugh.

A reading was taken in the flue at the back of No. 4 furnace every hour for 10 hours, and a careful note was made each hour of the quantity of refuse thrown on to the furnace bars. The whole is graphically delineated before you in the form of a figured diagram [see following page], so I do not occupy time in reading you the figures, but the result is interesting and important. Calculations carefully made as between the average temperature registered, viz., 1356° Fahr., the weight of the fuel burned during the 10 hours, and the estimated amount of air passing through the furnace and heated from 40° to 1356°, discovered that as nearly as possible 1 lb. of the refuse would evaporate into steam 1 lb. of water. Now, this result is much lower than is recorded in respect of the refuse furnaces of Birmingham and Warrington, which have boilers connected with them. In the former the evaporative power of the refuse was found to be 1·79 lbs. of water to the 1 lb. of refuse, and in the latter case, 1·47 lbs. of water to the 1 lb. of refuse. But it must be recollected that here in Glasgow all the cinder is abstracted from the destructor fuel and goes to supply steam for the works. However, the horse power lost is very considerable, and amounts in the three refuse despatch works to not less than 7018 horse power per night of

FLUE TEMPERATURES



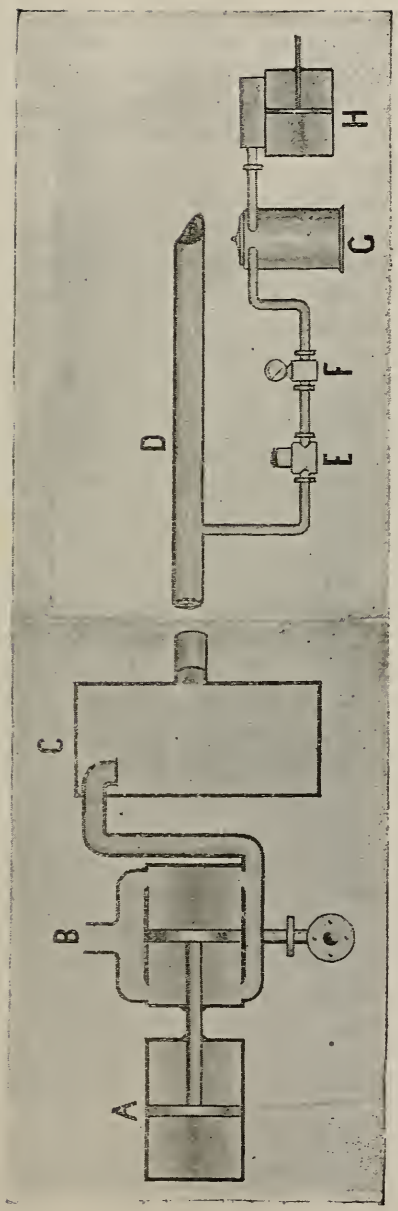
10 hours, or almost 702 horse power per hour. Calculating the value of the horse power at one halfpenny per hour, or two-thirds of the rate charged in New York for this equivalent in steam, the Cleansing Committee are nightly parting with a commodity they might be able to sell in the form of steam for £14 12s. 6d. nightly, or per annum of 3000 working hours, for £4387 10s. Out of this sum which may be obtained for the steam, what might be termed the *pure loss* is its equivalent in coal at 7s. a ton, which amounts to £1213 12s. 6d. per annum, and the firemen's wages, which, of course, are at present lost. Each of the arc lamps of 2000 candle power to be seen burning in Buchanan Street any night takes 1 indicated horse power per hour to keep it going; so the power of these furnaces, if utilised, after deducting 20 per cent. for conversion of power and leakage, would with suitable machinery supply 562 such arc lamps, and light on the low-tension system 19 miles of streets at 60 yards from lamp to lamp, within a two-mile radius of each of the works. One of the great drawbacks to a large and general use of this refuse for power production is the irregularity of its supply. But in order to ensure an approximation to regularity, the cleansing of Glasgow is arranged on the "block system," and hence, with a little storing on certain days, an average quantity per day could be arranged, even enough for practical purposes.

You will see from what I have stated that the Corporation are in quite an exceptionally good position for trying the power and usefulness of steam for heating and cooking in a few selected buildings near to any of their works, either in tenements belonging to themselves, or, by special arrangement, in the property of private proprietors. The labour, the fuel, and the furnaces are on the ground; nothing is wanting but the boilers, the pipes, and the appliances to inaugurate the beginning of a system which, in my opinion, Glasgow will one day possess, and, looking back, will be surprised she did without so long.

I now have pleasure in directing your attention to another phase of municipal enterprise which has not

hitherto been developed to any extent in this country, but which all first-class plumbers should know something about, and especially those who have aspirations to serve their fellow-citizens in the march of progress. This time the object lesson is Paris, whose huge underground sewers afford ample accommodation for the transference of power from central stations. I am indebted to the British Association Lectures of 1889 by Professor A. B. W. Kennedy and to Professor Unwin for much of my information under this heading.

Compressed air has for a very long period been in use for various purposes, principally for driving tunnels such as the Mont Cenis and St. Gothard, sinking mines, raising sunken vessels and treasure, and transporting goods and parcels swiftly from one place to another. Comparatively recently its manifest advantages as a clean, simple, and effective "maid of all work" have been recognised, and to M. Popp we are indebted for first introducing it among the Parisians in 1870. Curiously enough, the desire to be always "up to time" was the cause of its introduction to the "gay city." The Parisian clocks seemed about this time (something like the Glasgow clocks of to-day) much in need of accurate and simultaneous regulating. He accordingly installed a small system of compressed air distribution, and, by impulses of this most elastic medium, wrought and controlled a large number in the city. In 1889 the number of pneumatic clocks thus impelled to mark time was 8000. From this small beginning, with two compressors and mains $\frac{5}{8}$ inch to $\frac{7}{8}$ inch in diameter, the system has gradually grown until to-day there are two large central stations with boilers and engines developing 12,000 horse power, with principal mains 34 miles in length and ranging from $1\frac{1}{2}$ inches to 20 inches in diameter. There is a probability of the total power being extended to 28,000 horse power. The main pipes are $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{4}$, and 4 inches diameter of ordinary wrought iron tubing, 12 inches diameter made of cast iron, and the last new main is 20 inches diameter made of steel. It has been thought possible to transmit this handy and hygienic power up to



AIR COMPRESSOR

10,000 horse power in main pipes a distance of 20 miles, and to obtain in suitable engines at that distance as much as 6000 to 7000 horse power. A general comprehension of the system will be obtained by reference to the diagram on the preceding page. Here A represents the main engine at the central station. B is the compressor, together with a cold water pump which cools down the air, as, in the process of squeezing, it acts like a man in a vast crowd and becomes hot, its temperature at 75 lbs. per square inch (absolute) being about 256° Fahr. C is the large air reservoir from which the various branching mains are fed. Then at the point of use, where the engines or motor is needed, we have the small wrought-iron or lead pipe from the main in the street led to the meter E—the supply valve F. The valve F may either be attached direct to the motor, or, as is commonly done, to a small heating coke stove G. The reason of this latter method is two-fold. First, because if the air is sent direct from the mains into the engine at 60° or 80° Fahr., it becomes so cold during its expansion to the ordinary pressure of the atmosphere that it is apt to produce hoar frost and icicles in the exhaust ports and the exhaust pipe; and secondly, it is found that by heating it first its efficiency in the engine is nearly doubled. H is the engine or motor in the shop or workshop.

I need scarcely say that by the action of a reducing valve any pressure may be used which is considered advisable. The pressure in the mains is about 6 atmospheres absolute, or 90 lbs. to the square inch. The meter for measuring the quantity used is just an anemometer and counting dial.

There is no time now, nor perhaps is this a suitable occasion, to show you the scientific side of this system, although it is of the deepest interest and beauty, so I will just touch on its cost to the producer and to the consumer, and in passing make a few remarks with respect to other agencies of power, such as coal gas and compressed water, in the general distribution of which I take it all good plumbers are deeply interested, as I find from their kind answers to my questions 200 master plumbers in this city out of the total 239 are quite prepared

to lead the new hydraulic pressure into any building, whenever the Corporation start their machinery.

I will then finish with what to me, at present, is an important phase of this subject, and seek to show the paramount sanitary advantages of compressed air as a motive power of factories, workshops, and shops.

In the large new Central Station at Quai de la Gare in Paris, the compressors produce 438 cubic feet or 33½ lbs. of air at 7 atmospheres for each indicated horse power per hour in the steam engines. 883 cubic feet or 67½ lbs. are compressed to 105 lbs. per square inch for one penny sterling. Professor Reidler has given us the advantage of his tests with compressed air in an old 80 horse power steam engine in Paris, which, after adaptation, yielded 72 indicated horse power for the consumption of 31,000 cubic feet of air or 2376 lbs. of air per hour at the pressure of the atmosphere. This air before introduction to the old steam engine was heated to 300° Fahr. by burning 15 lbs. of coke. If we divide 31,000 by 883 we find that the 72 horse power per hour were obtained at a cost of 35 pence, and by dividing 35 by 72 we have, as the cost of the air used in that engine to produce one horse power per hour, not quite one half-penny *plus* 15 lbs. of coke. Of course, the producing of this 883 cubic feet of compressed air for one penny does not allow for depreciation of machinery and plant nor interest, which, according to competent authorities, is covered by $\frac{4}{10}$ of a penny more per horse power per hour, so we have in the final result $\frac{9}{10}$ of a penny per hour as the cost of the air used in a converted steam engine or £11 5s. per year of 3000 working hours for every effective horse power.

Now, while hydraulic power is admirably adapted for straight motion, such as we find in cranes, lifts, hoists, and presses, it is, on account of its non-expansive power, quite impracticable where rotary motion is desired. Even on the sliding scale of the London Hydraulic Power Company, by which a consumer of 500,000 gallons per quarter is charged only 2s. per 1000 gallons, we find that, instead of paying £11 5s., he would require to pay £43 15s. per effective horse power per year of 3000 working hours. This puts it quite

out of court, as this amount of compressed water is about what would be used by a consumer with a 5-horse engine—an effective horse power per hour requiring 146 gallons per hour at a pressure of 750 lbs. per square inch.

As to the use of lighting gas for generating power in gas engines, it has been found by experience that it takes 26½ cubic feet of it per effective horse power per hour, which, at 2s. 6d. per 1000 cubic feet, makes the cost £10 per horse power per annum of 3000 working hours.

In point of cost, therefore, gas is a serious rival to compressed air, 1 horse power per year of 3000 hours costing £1 5s. less, and, of course, it has the further advantage over all its rivals that it can be stored in huge quantities very easily and cheaply. On the other hand, compressed air, to my mind, has four main advantages over gas, and these are—

1. In the simplicity and cheapness of the motors that can be employed, and the little attendance these require;

2. In the variation of speed that can be obtained, and adaptability to varying loads put upon the engine;

3. In freedom from danger to life or to property from explosions or fire when an accident happens either to the motor or in the distributing pipes; and

4. In the first-class hygienic conditions which can be obtained in crowded factories and workshops by the use of compressed air engines.

Only upon the last of these advantages would I offer a few observations before closing.

Nothing is more patent to anyone who inspects the smaller factories and workshops in a large industrial community than the absence of adequate means of ventilation, and the production of evenly and suitable temperatures for the workers.

We all know the high death-rates from pulmonary complaints which are due to the want of efficient ventilation in such places as flax mills, cotton mills, woollen mills, and the like, but in our small factories and workrooms such as printers' shops, bookbinders' premises, calendering works, dye works, tailors' workrooms, button-

making works, colour grinding factories, etc., we have a state of things becoming intolerable, and a burden of responsibility is cast upon us of momentous importance. I have found tailors in Glasgow plying their needles on a cool day in a steady temperature of 82° Fahr. On the other hand, I find young girls sitting all day, just under the slates, at the engine-driven sewing machines with the temperature in the workroom a little over 40° Fahr. in such weather as we lately passed through. As there are no adequate means of ventilation in close, stifling weather, so there are no proper methods of heating such premises when the chilly frosts appear. Add to these discomforts the constant inhalation of stagnant pre-breathed air and you have all the key you need to the firm and continuous grip of phthisis upon our factory and workshop operatives. Their homes may be to blame, and in some cases must be blamed, for the wide prevalence of this terrible scourge in our midst, but the unwholesome factory and the overheated or chilling workroom has, I think, much to answer for. How can we meet such conditions with gas engines? Their poisonous exhaust is only fit to be sent up the chimney, and hardly fit for that—much of it we find spluttering out through holes in the windows. In the majority of cases the manufacturer has no spare power; very often he has too little for his needs, and so cannot put the small extra burden on his gas engine of driving an exhaust fan. And even if he could, the want of heating appliances would render its use insufferable. Here the compressed air motor comes in as no other known motor could. By simply regulating the small heating stove and the pressure, you can obtain an exhaust from it of pure wholesome air, the whole of which, or part of which, can be discharged into the workroom at the temperature desired. Professor Kennedy informed the British Association there was neither heat nor smell from air motors. "Very large printing offices in Paris, almost unbearable," he said, "with heat and stuffiness, are rendered quite pleasant by allowing a portion of the exhaust to come into the room." What an advantage, sanitary and commercial,

such a motor would be in all our butchers' shops, large dairies, and restaurants, where the exhaust could be utilised to do all the cooling or even freezing in the warmest weather. From a sanitary point of view alone its free use in such a city as ours would be well worth double the money now spent in steam or gas power. I have no doubt that further improvements in its production at the central stations, as well as in the motors which utilise compressed air, will bring its cost down to near the level of steam and gas, and that before long; meantime, I am satisfied if anyone here has become interested enough to look carefully into a subject but little known and appreciated outside of a select coterie of expert engineers. Its day will come, and it can well afford to wait. I say this in full knowledge of the failure of the Birmingham Compressed Air Company. Their mains were so badly laid and leaked so much that they could not hope to succeed. The early experience of Paris should have been to them a warning. When it does come, let plumbers be ready. In many a home a poor outworker at her midnight sewing, or a cobbler cobbling until one in the morning, shall send for him to connect the small air motor which will assist to do the work in half the time. Not the least deleterious part of many a humble life is that part of it spent in labour at home which should be given to rest. Voluntary labour it may be called, but what is voluntary when starvation or other hard personal necessity compels? Any power you can safely supply to lighten or expedite such labour must be a blessing. The homes are counted by thousands in Glasgow where such work is daily and nightly done—done by the unaided hand and arm. Steam and gas motors are useless here; their giant arms are too big, their breath is too dangerous, for home work; and unless the fiat of Government is to be pronounced against all such labour, such labour ought to be made as easy and expeditious as possible by the offer of a safe and sweet motive power, at the cheapest possible rate. Such may be had by the distribution of compressed air.

I trust I may not to-night be considered as one who might as well have been dumb. I had nothing to say to

you on plumbing or on sanitation which has not been exhaustively and well said by able lecturers of past years. I believe our city has a big future in front of her, and I as firmly believe her plumbers must materially assist in her growing prosperity and greatness. As trades such as yours advance in knowledge and usefulness and power, in breadth of view and in the application of applied science to the pressing needs of our teeming population, so shall be hastened the end of our present privations and needless waste.

To those now in life's meridian the city of pure health is as yet but a vision. Our forefathers had visions also, and the dreams of their most sagacious are to-day more than realised. Our hopes rest on our young men. The young plumber need no longer fight his battle, and seek to conquer the information he needs in the slow school of experience. He alone who has learned the value of a noble discontent, and eagerly seizes the provision for fuller education and technical training shall reap the profit due to earnest labour. Register! Register! Register! was the battle cry raised by our chairman at the beginning of this campaign. Drill! Drill! Drill! should now be the words on the standard raised in the sight of every young plumber. Drill in education; drill in the theory of your work; drill in the best practice of your trade.

Behind you stand, at headquarters, the Worshipful Plumbers Company of London. Beside you march the officers, the councils, secretaries and teachers in your districts. Before you are the enemy—the destructive forces at the heart of city life. These should not be allowed to proceed unchecked until every resource of human ingenuity is exhausted.

Vested interest in smoke pollution, in ill-ventilated factories, in overheated or chilling workshops, in disease-producing homes shall surely stand aside before the dawn of a clearer knowledge.

Science is even now pointing the way. May I express the hope that in the future prospects of the plumber lies embedded, in great measure, the realisation of our dream of to-day—the city of comfort and health.

[*Reprinted from* "The Sanitary Journal," *November*, 1895.]

ADDRESS

TO

YOUNG PLUMBERS AND INTENDING SANITARY INSPECTORS.

On 11th October Mr. Peter Fyfe, F.R.S.E., chief sanitary inspector of the city of Glasgow, delivered the inaugural lecture of the eighth session of the theoretical classes, conducted by Mr. David Fulton, and the third session of the practical class, taught by Mr. Francis M'Culloch, under the auspices of the District Council of the National Registration of Plumbers, in the Glasgow and West of Scotland Technical College. Sir John Neilson Cuthbertson, LL.D., chairman of the governors of the college, presided, and there was a large attendance of students and of gentlemen interested in the improved education of the plumbing trade as a safeguard to the public health. The chairman, in introducing the lecturer, expressed the interest of the governors in the growing success of these classes. From 126 students, enrolled in the first session of the theoretical class, the numbers had risen last year to 183. In the practical class, the number who came forward in its first year was 81, while last year the enrolments were so large (110) that the class had to meet in separate divisions on three nights each week. No department of the college had given the governors greater gratification. No doubt, there were to be found self-taught men, mother wit, and natural instinct in the plumbing as in all other trades; but, speaking generally, it was absolutely indispensable, in the present day, that every man who desired to succeed in his trade should be thoroughly well educated, and should give the best of his brains to his work. Mr. Fyfe, in his official capacity, might be described as a terror to evil doers, and a praise and protection to them that do well. Mr. Fyfe then proceeded to deliver the following lecture:—

Again I am honoured by your teacher, and greet you at the commencement of your studious winter. Summer has again passed us. The long days of sunshine and

evenings of joyous leisure and invigorating sport are closed. Our rested minds anew seek the delight of study. We have drawn the sweetness of the summer suns, the happiness which a holiday with nature ever brings, and now we again peer beneath the surface of her coverings, and try to learn some of the secrets of her workings. There are many students and many kinds of students. It is hard to draw any line of demarcation between classes of real students—persons who are devoting themselves to the cultivation of the understanding. Yet, as there are the aristocracy and the democracy in society, so there exist in student circles through the world the two great main classes, viz., those who follow the æsthetic and beautiful, and those who follow the practical and utilitarian or useful. It is contended that everything which is beautiful is useful, and, *per contra*, everything which is really useful is beautiful; but without troubling ourselves to pry closely into such abstractions, we may accept the above statement, in its broad aspect, as approximating the truth. The leisured student who stores his mind with Greek learning and revels in our finest poesy, the creations of Chaucer, Spencer, and Dryden, is a very different kind of student from him whose mind is bent upon hydrostatics and the science of plumbing in its widest sense. We meet as plumbers here to-night. Our objects are manifestly of the practical and utilitarian order; but still the elements of the subjects bearing on the plumbing trade carry with them considerations of the highest beauty, and as the astronomical student through his telescope can worship the Creator from the mountains of the moon, so we through the Tantalus cup in the bathroom can behold Nature's great law of the "hydrostatic level" at work, and worship as well. There is sometimes a silent, subdued opposition noticeable between those who do theoretical work and those engaged in what has been termed "practical." Because the astronomer cannot show a mining syndicate a pathway to Mercury or Saturn—because the clergyman cannot manufacture a moral man and place him in the Golden City with a palm in his hand—because the physician cannot drug

every man and woman over the three-score years and ten, they are sometimes quietly sneered at, or at best only tolerated by those whose hands are daily engaged at making something. On the other hand, the scholar, with whom action is more or less a subordinate matter, looks down on the "practical" man, and, with a scarcely veiled contempt, believes that general ignorance dwells within him as a matter of course. So two essential features of life become, in their representatives, estranged, instead of being, as they ought to be, united and inter-supporting. The highest and truest individual man is the man in whom the two meet. He who unites sound theory to sensible practice is the man of all time—a veritable creator within the creation itself. No matter what the profession or trade may be—a doctor, an engineer, or a plumber is only half a doctor, half an engineer, half a plumber who has a complete course in theory and no practice, or, on the other hand, who possesses a complete course in practice and has no theory. The theoretical faddist still stalks among us dinning his panaceas for all kinds of social ills into unheeding ears; and the "rule of thumb" man may be seen every day walking about with his rule in his hand, leaning solely on his past experience and the knowledge of what his father did. Both are unfortunates, as, having two eyes, one is blind, and therefore neither unfortunate can look straight nor see clearly. Whatever may happen in the future to help the pure theorist to see with his practical eye we know not; but this we know, that in this hall to-night we have a sample of what the practical man is doing to open *his* blind eye. Technical education, so long talked about in my boyish days, has come at last, and plumbers here have to congratulate themselves that among their number in this city are men who have both eyes of their minds open, and who have arranged those evening lectures and classes so that the brain may be skilled as well as the hand. Does it look to any like a bit of dull routine to come here on two nights of every week, after the labour of the day is past, and study the metallurgy of lead, zinc, copper or iron, hydrostatics, hydrodynamics, and geometry and mensura-

tion as applied in the plumbing trade? Does it only fill in a vacant hour in a semi-pleasant way, and leave us next day beside the old milestone we passed bye the day before? Then, in the name of all that is sacred, let us stay at home, follow quietly in the steps of our forefathers, without resource, without hope of creating anything new and useful for the benefit of our fellow men. If these classes—if this tuition means anything at all—it means the spreading of a man's roots to a foundation from which he may draw, as a tree does from deep soil, the nourishment necessary for his after growth. No doubt the doing of our daily tasks earnestly and well is an education in discipline and has a formative action on character of the highest importance; but, when along with this determination a young man starts life with the firm conviction that he should do nothing without fully understanding why it is done, and asking himself if it could be done in a better way, he comes to learn the true value of labour and experiences the sweetness of possessing the power of resource.

Now, this power of resource is the key with which every man must unlock his future. Be you what you may at this present hour, no one can tell to what you may be called ten years hence. The pages of biography are full of humble lives raised to eminence and vast usefulness to humanity, simply by the ability to use this power. In every life there come times when it is felt that a trial of strength has to be endured. If in the trial you are overweighted—if your resources are not equal to the occasion, you sink back to your level, and the feelings of despair creep upon you. The world looks like a huge piece of flint through which you cannot pierce, and you feel like lying in your hole and ceasing to bore any longer. The vast majority of men and women are like this. They eke out their lives hopeless of bettering their condition, because in all probability their environments and early education left in them but limited resources by which to climb higher than they are. The civilisation of which they form a part has the habit of appearing to such as the climax of the ages. What *can* there be more to improve? they cry. At the end of this

nineteenth century we are surely at the very pinnacle! Our trains run at 70 miles an hour, our steamers join the two vast continents in six days, our streets and shops are illumined by electricity, our very sewage is swished out of our sight by simply touching a handle; let us eat, drink, and be merry, further advance is surely impossible! These folk are usually quite ready to believe the millennium is at hand. They forget that all these things are the products of two generations, and that everything is pointing to as great a revolution in all branches of applied science within the next two generations. Truly the "mills of God grind slow," but to men who can survey the fields of mechanics and chemistry there is the veritable appearance of speed, when consideration is given to the time since which these sciences were practically unknown.

It is too often taken for granted by young men entering upon a trade that all has been discovered that is worth discovering. They do not put themselves in the attitude of the reformer. Especially to the plumber is the door open to greater things in the future than has been accomplished in the past. In a lecture I had the honour to deliver during last winter to the plumbers of the city I tried to show that the continual development of great cities called upon the plumber to further develop his powers of resource. Even the great water-carriage sewage system which your trade has carried to such perfection, and which every city in the world with levels at all is willingly adopting, is capable of much improvement. We have seen even in our own time a complete change in every piece of mechanism whereby our sewage is removed silently and safely out of our sight. Twenty years ago a flush of water in a water-closet was whatever the householder willed to make it, and even then our receptacles were far from being in a sanitary state. Now we have the wash-out and the wash-down water-closet clean flushed by two gallons of water, which two gallons is, or should be, quite out of the control of the citizen to minimise or amplify. True, I have, along with others, called for three gallons, not because I would not prefer two, but simply because the drains at the bottom of your pipes are

neither of the size nor of the level to safely permit of two gallons being employed. Take an example. A 4-inch drain set at an inclination of 1 in 40 should pass sewage through it at the rate of 4 feet a second, or 240 feet a minute. Its area being ·0897 square feet, simple multiplication shows it can run off 151 gallons in that small portion of time, running full, or 21 cubic feet. So we see that no possible rainfall on the roof of a tenement, and including all that could be sent down sinks and water-closets in that brief space of time, could fail to be safely carried into the sewers by a well laid 4-inch pipe. But a 4-inch pipe is not a good carrier of ashpit refuse, scrubbing-brushes, and old boots, so your calculations are set at nought, and a 6-inch pipe (needless otherwise) has to be provided by proprietors.

Again, the sewers are not unseldom at an insufficient depth to allow of a proper run in the drain, so a large pipe has to be adopted in order to minimise the friction in the pipe. Yet, remember, the larger your horizontal pipe, your wetted perimeter is the less, and so, without three gallons per flush, the depth of water in the drain becomes too small for floatage. Here then at the very threshold of your special every-day avocations is a problem awaiting solution, viz., how best to convey all the waste water and sewage from any building with the minimum of material and the minimum waste of hydraulic power. It must always be remembered that two powerful reasons exist why a close study should be given in your calculations to the minimising of hydraulic waste. First, because water is yearly becoming a very valuable commodity. Taking Glasgow as an example, and supposing there are 50,000 water-closets in the city flushed each ten times in the twenty-four hours, we have, at 3 gallons per flush, a daily use of 1,500,000 gallons. If, by good construction of basins, pipes, and drains, one gallon per flush can be saved, we conserve for other uses 500,000 gallons per day or 182,500,000 gallons in the year. Now, at the rate of 1s. per 1000 gallons, this means a saving of £9125 per annum. We thus see how important it is that the best brains should be devoted to this problem. But the second reason is also of some importance. As you

know, corporations all over the kingdom are now compelled to adopt schemes of sewage treatment and purification. Glasgow has made a brilliant beginning in the east-end, and before many years are past every drop of her sewage will be pumped, mixed, precipitated, and filtered before it passes on its journey to the sea.

Now, I have calculated, from the annual report of the manager of the sewage works at Dalmarnock in the east-end, that the pumping, precipitating, and filtering of each million gallons of sewage treated there costs £2 15s. 6d., not by any means an exorbitant amount; yet, if a two-gallon instead of a three-gallon flush were found feasible in the water-closets of our city, a saving would be effected of £506 8s. 9d., which capitalised at 3 per cent. is equivalent to £16,881. But we must take things as we find them, and with existing conditions the waste I have alluded to is in most circumstances unavoidable. But with that better understanding of, and keener insight into, the theory of hydraulics which young plumbers are now receiving, I feel sure a change will come, and our domestic machinery will be driven with greater efficiency and at less cost to the community at large.

Again, plumbers are becoming more and more concerned in the efficient distribution of hot water among the citizens. In our cold climate during four or five months of the year, a free distribution of cheap hot water is really a hygienic consideration. The great injunction "wash and be clean" is, I think, very inadequately obeyed by the vast mass of the population. Is this to be wondered at when the daily ablutions of thousands have to be performed during the winter months in water not far above the freezing point? I fear it is not thoroughly understood by the well-to-do classes that our labouring people, aye, and even our lower middle class, are suffering from what I will term hot-water starvation. One man told me some time ago he had not had a bath for 40 years. That man was either a fool or a knave; but I fear hundreds of people are satisfied with a "cat's wash" from November till March. Here, again, is a problem for the young plumber, viz., how to supply in the cheapest manner and with complete safety, in each household, a fair amount of heated

water. You all know the main principles at present underlying our present methods and generally the means adopted by boiler, hot-water tank, and circulating pipes, to yield this necessity of city life. It is beyond the means of the humble householder to adopt these means, and the man will be a public benefactor who discovers a simple and efficient remedy for this hot-water starvation. Here, again, a complete grasp of the principles of hot-water circulation, pressure reduction, friction in pipes, and heat absorption is all important to the student. The late loss of life by domestic boiler explosions during frost shows the necessity for urgent reform in our present system. To fully combat this danger, the principles of steam production and control must be mastered. We have seen in late years giant strides made in the manufacture of water-tube boilers for manufacturing and marine purposes. In these, when a burst occurs, the outlet of steam is limited to a small area, and a big and disastrous explosion is obviated, while the necessary repairs are inexpensively made. Where is our practicable water-tube domestic boiler? It may lie in the brain of some young master of the plumbing craft, but that brain must have passed through the refining fire of a sound technical training. As we cannot "gather grapes of thorns nor figs from thistles," so also we cannot expect the solution of our civic and domestic problems by uneducated plumbers.

In the new field of applied hydrodynamics the plumber, if he chooses, may soon find an important place.

In our large cities an old giant is asserting his right to assist in doing us general service. Until quite recently hydraulic power was called into action in odd corners, to compress our bales and our tobacco, make our lead pipes, and occasionally to blow our organs and operate our hoists. Now it is about to be distributed through our principal streets. In London, Liverpool, Hull, and Birmingham plant was laid down some years ago to send water, compressed to 700 and 800 lbs. per square inch, to do duty in many different ways, and a few months ago Sir James Bell, our most esteemed Lord Provost, inaugurated the

opening of the Glasgow Hydraulic Works in High Street from which this power will be dispensed at 1100 lbs. per square inch. The use and control of this giant power ought now to be studied by all young plumbers. It is quite certain that, with this high pressure, various small rotative motors will come into the market, such as impulse turbines, which, in a very simple and efficient manner, will take the power from the mains and drive the light machinery of our small factories and workshops, especially where the machinery is not in continuous use during the whole working day. It must also be borne in mind that it will easily afford the means to small industries and large shopkeepers of generating such electric current as they require at night to light their premises with electric light. Experience has shown that small turbines, inexpensive and easily managed, will drive a small dynamo with great regularity of power and speed. Its uses in fact are innumerable, and the young plumber will be wise who so posts himself in the theory of high-pressure hydrodynamics as to be able not only to give practical advice to a customer, but to lay down a small motor and connect it to the Corporation mains and its exhaust to the drains. The new system of municipal hydraulics is in its infancy; its applications are important and numerous. I would strongly urge upon you to hold on to this infant, because when he is become a full-grown man he will, or ought to, become a big blessing not only to the inhabitants of Glasgow but, and especially so, to the whole plumbing fraternity.

Perhaps it will be considered fitting before I close that I should allude to a resolution which was passed at the congress of your trade recently held in Dumfries.

There it was agreed that, *other things being equal*, a plumber was specially fitted to discharge the duties of a sanitary inspector. This proposition is based on the assumption that drainage and plumber work are among the important questions, if not the most important, a sanitary inspector has to consider. There can be no question that good drainage and water supplies are matters daily exercising the sanitary official's mind, although whether they are

the most important of his many functions is open to debate. I mean it will not do for the young plumber to infer from the resolution that, because his hours of labour and his hours of leisure are devoted to plumbing, drainage, and the supply of water, he, of all tradesmen, must be most acceptable as an inspector. The words "other things being equal" have a most important bearing. I doubt not there are many here who have a desire to serve their country as sanitary inspectors, and I therefore will amplify a little on the words "other things being equal." It may assist you in your after studies to know what "other things" means.

Now, in the first place, a solid and intimate acquaintance with the three R's, viz., reading, 'riting, and 'rithmetic, is absolutely essential. I intimated on a former occasion here that, in my opinion, young plumbers require to give special heed to such subjects. My opinions are not changed. The writing of reports in a fair hand, grammatically expressed and faultless in spelling, is one of a sanitary inspector's prime requisites. No assiduity in the study of drainage, ventilation, construction, and the sanitary law will compensate for a neglect of these too often neglected subjects. Aye! and even were you to wish only to make substantial progress in your own trade—such knowledge is of the first importance. Plumbers' apprentices, I know, are very young when they enter upon their trade. Straight from the magnificent palaces of our School Board, they enter the shop, and begin the lowly service of the bolt-heater and general hanger-on. Too often, I fear, the proficiency acquired in school is lost through a lad forgetting that his proficiency will rust and decay if not kept bright and fresh by continued application. I know, by the experience of a long apprenticeship, the temptation to forget, and simply float upon the leisure hours which follow the day of toil. A more insidious temptation does not lie in your path; but, like all other temptations, it must be conquered. Your reading, writing, and arithmetic are the foundations of your life work. Unless these foundations are hard and solid and permanent, the superstructure you all desire to raise will be partial and disappointing.

Another matter I would urge upon you all is that of drawing, or the correct and proportionate delineation upon paper of objects you see, and the showing of these objects in cross and longitudinal section. To the plumber this will more and more become important, and to the sanitary inspector it is invaluable. The cultivation of this faculty lends a power to the student which fits him for positions unattainable without it. When acquired, he may proceed in a remarkable way to utilise his gifts of imagination if he has any. Necessity is truly the mother of invention; but necessity, like many other mothers, is none the worse of a mother's help, and one of her best helpers is drawing. Moreover, drawing is fortunately one of these studies which yields, in its pursuit, a peculiar interest and pleasure. As the faculty to delineate grows, the pleasure increases, the imagination is fired, and original creation becomes possible. Man is a creator as well as a creature. He creates in the sense of utilising in hundreds of ways, before unheard of and unknown, the infinite resources of God's creation, Nature; and those who work among the material substances, and put them into shape for the use of their brother men, are especially the people to whom the power of the pencil is one both beneficent and profitable. Therefore, let not a single figure or section exhibited by your teacher, Mr. Fulton, either on paper or on the blackboard remain untransferred to your note books. Never mind how crude or ungainly your attempt at first may be. Proficiency at last will come to the faithful student, and proficiency will bring in its train a sense of power, and greatly enhance your store of resource.

I also direct your attention to a general consideration of such subjects as ventilation, heating, the elements of chemistry particularly in their relation to water, air, and food. You will require to possess some intelligent notions as to infectious diseases, their causation, characteristics, and hygienic treatment, the treatment of sewage and domestic refuse, the diseases of cattle—particularly of cows and swine—and, lastly, you ought to acquire a fair understanding of sanitary law. On all these subjects you will be examined

when you go to pass for your certificate before the Sanitary Association of Scotland. Without that certificate in your possession, or some equivalent diploma in the elements of sanitary science, neither plumbers, joiners, masons, nor any other class of tradesmen have much hope, in these days, of becoming sanitary inspectors. The only "Open Sesame" of any avail at the door of position and influence is knowledge. She is the latch-key each one of you must have in the pockets of his brain.

One other thing must ever be in your remembrance, viz., that your own physical health is a prime factor in the estimate of your future success. Poverty is nothing. Perhaps you will be inclined to smile when I say that being born without the proverbial "silver spoon" in your mouths is immensely in your favour. Run up in your memory the names of the brightest and most successful men in our modern history and you will find nearly every one of them began life in the most humble circumstances. Merchants, manufacturers, engineers, professional men, inventors, railway magnates, aye, millionaires, bear out this general truth. And the converse of this is not less true, viz., that those to whom a fortune has been bequeathed in their youth are often children of the deepest misfortune. But you must have health and vigour. Anything you do, either by commission or omission, to reduce the full flow of good blood in your veins, will tell against you in the fight. Hindrances will come in your path, which will need all your power to remove, but which can be removed by him who has all his vital powers in full play. As Napoleon Bonaparte said—"All the great captains have performed vast achievements by conforming with the rules of the art, by adjusting efforts to obstacles." When efforts cannot be adjusted to obstacles it implies imbecility, and we all know that imbecility, either of mind or body, must drift helplessly about until it sinks hopeless to the bottom of life. Public health is composed of the many atoms of private health. No one can have too much vitality; most people have too little or just what serves them for each day's routine. Such cannot possibly be great, nor win a prize in

the great struggle of the "survival of the fittest." I hope all of you will ponder this grand universal truth, and that as years go on some of you, through attending those classes here, will rise by energy and perseverance to be men of influence and worth.

At the conclusion of the lecture, which was listened to with rapt attention, a hearty vote of thanks was accorded to Mr. Fyfe, on the motion of Mr. R. D. Munro, seconded by Mr. Fulton. Councillor Steele, Mr. John Young, and Mr. Francis M'Culloch, thereafter addressed the students, and the proceedings terminated with a cordial vote of thanks to the chairman, proposed by Mr. John Gordon, I.A.

HOUSING

OF THE

LABOURING CLASSES.

A LECTURE

DELIVERED BEFORE THE GLASGOW AND WEST OF SCOTLAND ARCHITECTURAL CRAFTMEN'S SOCIETY

BY

PETER FYFE, F.R.S.E.,

Chief Sanitary Inspector, Glasgow.

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HOUSING OF THE LABOURING CLASSES.

January, 1899.

TO choose a subject which may be instructive as well as interesting to a select audience is a difficult task, especially when the lecturer is himself not one versed in the history, progress, and technique of the noble art of which his hearers are the votaries. To you whose life study is architecture—to you who are daily thinking of how to combine the beautiful and proportionate with the practical and economical in modern building construction, and nightly dreaming of the stones of Venice, the Pantheon of Rome, or the Athenian Acropolis, nothing I could say on these subjects would be useful or new. I thought, therefore, to take a subject near to the heart of every thinking man in these days—nearer to you, perhaps, as citizens than as architects, but yet touching you and your profession on many sides. The Housing of the Labouring Classes is deserving of your study. Municipal authorities all over our kingdoms are darkly groping after a policy which will end the acknowledged unsatisfactory state of affairs, and at the same time place the poorer classes in healthy, comfortable houses without encroaching upon their feeling of independence. In this city, as in others, the question is pressing, and as you are the men who very shortly must consider all the necessities and difficulties of the problem, I propose to-night to address you on some of these. But I would also seek to fire your hearts with sympathy for the whole subject. In order to do this I must try to show you how the great mass of our poor live—where they live—why they should not live as they do—and where and under what circumstances they ought to live. In order to help you to a clear perception of the problem as it is put before us in Glasgow, it will be necessary to lead you for a few minutes upon a consideration of the legal aspects, because, over and beyond the dictates of sympathy and humanity, stand the imperative demands of the law. It is now forty-seven years since the first of the Shaftesbury Acts was

promulgated dealing with the proper lodging of the labouring classes. These were in turn succeeded, in 1868, by the Torrens Acts for the provision of suitable houses for artizans; and in 1875 what is known as the Cross's Acts were passed, giving legislative improvements in the same direction. All these led up to the Housing of the Working Classes Act of 1885, which in turn was almost entirely supplanted by the Act of 1890 bearing the same designation. This important Act is divided into four divisions, and has seven schedules attached to it. The first and second divisions need only be considered, as they deal with the powers to be exercised by local authorities (1) over unhealthy areas and (2) unhealthy dwelling-houses.

In Glasgow, Part I., dealing with unhealthy areas, has been a dead letter, because, firstly, the "official representation" to the local authority must show that "the sanitary defects in such areas cannot be effectually remedied otherwise than by an improvement scheme for the rearrangement and reconstruction of *the streets* and houses within such areas, or of some of such *streets* or houses;" secondly, because the late Police Clerk, Mr. Lang, reported, *inter alia*, in 1895—"The legal process provided by this part of the Act is tedious, circumlocutory, uncertain, and expensive;" and, thirdly, because the Corporation has an Improvement Trust Committee whose special function is to arrange and carry through large city improvement schemes when such become necessary, and this committee invariably proceeds by scheduling such areas and securing the necessary statutory powers for their reconstruction by means of a local Act.

Even the County Council of London, which has done much work under the Act, has only carried out three schemes under Part I., namely (*a*) that at Boundary Street, Bethnal Green, by which fifteen acres of narrow streets, courts, and alleys were acquired and destroyed, at a net cost to the ratepayers of £280,000; (*b*) the Clare Market Scheme of 1898, estimated to cost £216,500; and (*c*) the Churchway (St. Pancras) Scheme, costing £39,150. These three schemes will displace 9,843 persons from their houses.

Glasgow has done nothing. We need not, therefore, occupy time discussing legal powers which in this city have had no practical result either in unhousing or rehousing those of the labouring classes who dwell in insanitary areas.

The case is different when we come to Part II. Under this part of the Act, which affects insanitary dwelling-houses and smaller areas than are pointed at under Part I., good, useful work may and has been done. It should be noted that here the expression "dwelling-house" means "any inhabited *building*, and includes any yard, garden, out-houses, and appurtenances belonging thereto or usually enjoyed therewith, and includes the site of the dwelling-house as so defined."

The initiation of the procedure necessary under this part of the Act compares very favourably with that under Part I. Under the latter no one has the duty of representation or certification put upon him. The whole of the gigantic and costly machinery may lie rusting while the people are suffering, and blame can attach to no individual. The all-important duty of setting its powers in motion does not lie with the Medical Officer of Health until "two or more Justices of the Peace within the district, or twelve ratepayers, complain to him of the unhealthiness of any area." The lighter and less complex machinery of Part II. is, however, placed under the immediate care of the Medical Officer of Health, as the Act here distinctly states "it shall be the duty of the Medical Officer of Health of every district to represent to the local authority of that district any dwelling-house which appears to him to be in a state so dangerous or injurious to health as to be unfit for human habitation." This is Section 30.

The following section (31) applies the spur to laggard duty, as under it any four householders dwelling near the street in which the insanitary dwelling-house is situated may, by writing to the Medical Officer, compel him to report to the local authority, and, if nothing be done under the Act, these same householders, after waiting for three months, may legally petition the Local Government Board for an inquiry.

It will thus be seen that every responsible citizen whose interests or amenities may be prejudiced by the proximity of any unwholesome and insanitary building which is inhabited has distinct rights given to him by the Legislature. A little consideration will show the reasonableness of this provision.

It seems to be one of the great laws of city growth that, in the closely-packed areas near the centre, decay, once started in a property, proceeds with alarming rapidity towards rottenness. Roofs, walls, windows, doors, and floors, having served their day

and generation, like the worn-out organs of aged humanity, refuse any longer to do their work—refuse to be patched up—and await dissolution. But, unlike the old and done man, there is no respite for the old property. On the contrary, the older it becomes the more work it gets to do. Whereas fifty or sixty years ago it sheltered the family of the merchant prince or well-to-do tradesman, it has, by deterioration and unwise sub-division, to do the same duty for four or five families of the artizan. Time passes: and as the patchwork and repair of this reconstruction become worn and dilapidated, it falls in commercial value to the level which only the labourer and the casual worker can pay. A short time now brings it to its last and most degrading duty. Rotten in the ceilings and walls, open in the flooring, with rattling windows and tottering doors, it stands at last, neglected by owner and tenant alike, the uninhabitable dwelling-house—the haunt of poor unfortunates and the degraded—the home of the flotsam and jetsam of the city. Those who dwell or have business premises near it are now in danger. Ill health and evil manners are born and bred in it now. Both are contagious, and tend to corrupt the surroundings, consequently the Government has enacted that any four householders may protect themselves by written complaint to the Medical Officer of Health, and so bring about the destruction of a property which, like the worn-out old horse, it is painful to see doing further labour.

There is another class of property regarding which the citizen has powers of initiative granted him under this part of the Act, viz., the obstructive building. Here, again, the four householders may make a similar representation, but this time not to the Medical Officer of Health, but to the local authority itself, which for this purpose means its Town or Police Clerk. Now, what is an obstructive building? The Act says any kind of building whatsoever which "stops ventilation, or otherwise makes or conduces to make such other buildings to be in a condition unfit for human habitation or injurious to health;" or, in the second place, if "it prevents proper measures from being carried into effect for remedying any nuisance injurious to health or other evils complained of in respect of such other buildings." It appears fairly clear that this most important part of the Act (Section 38) strikes at that class of structures known in every city as back buildings, whether these buildings are used as dwelling-houses or

stores or manufactories. It is of no avail to argue that former law or want of law permitted of their erection. Standing, as they do, on the natural court or back yard of the dwelling-houses in front, preventing air and light, and proper ground space for ash-pits and conveniences, they stand condemned; but the loose law of former years and vested rights must here be recognised, and consequently, unless the obstructive building is itself unfit for human habitation, the owner of it may claim compensation, under arbitration, which may fall to be paid by adjoining proprietors whose properties have been improved and increased in value by its demolition.

I need hardly say there are many such obstructive buildings still in Glasgow. In only two cases has this part of the Act been applied here—namely, in Muirhead Street and St. Ninian Street on the South Side—and in neither case did the question of compensation arise, as both these back buildings were in themselves uninhabitable, and, moreover, belonging to the owners who held the front properties. Otherwise this useful and powerful section has been untried. Perhaps the main cause is the difficulty of acquiring of the site upon which the obstructive building is built. If the owner of the building does not wish to retain the site, which it is unlikely he would wish to do, unless he could erect another payable building on it, the burden of purchasing it falls *exclusively* on the local authority, who could only use it as an open space, and that without any power to claim compensation therefor as betterment against adjoining proprietors whose property would thereby be improved.

The weakness in this part of the Act, therefore, forces local authorities into larger schemes of improvement, and impels them to endeavour to acquire both the back obstructive property and that one in front of it, rather than pay for a site at the expense of the ratepayers generally which would immediately benefit but a small section of them, and, most of all, the contiguous owners.

True, we have the following section (39), which gives all local authorities power to acquire the whole of such areas, and appropriate them for the erection of dwellings for the working classes, but we need not occupy time discussing this very important section, as Glasgow invariably prefers to proceed with a local Bill for such purposes, rather than adopt the circumlocutory methods prescribed by the general Act.

The London County Council and the Vestries have, however, proceeded in fifteen cases under Part II. of this Act, displacing 5,082 persons, and intend to provide new dwellings for 3,766 of those displaced, at a total estimated cost of £222,323 18s. 5d.

We now come to a part of such schemes, the importance of which in a large city dare not be overlooked, viz.:—the rehousing of the labouring classes which have been, or should be, unhoused by schemes of demolition and improvement.

This phase of the problem has become so acute that it formed at the recent Sanitary Conferences in Dublin and Birmingham the principal topic of discussion. Necessarily at such meetings the discussions proceed on general and broad lines; but the extreme urgency of the matter in all large cities, and particularly in our own, impels me to ask your forbearance while I attempt to examine the whole subject in detail, and endeavour to lay down from experience, and from facts and figures kindly given me by several gentlemen of experience, a basis for guidance and future action.

Part I. of the Act we have been considering makes it essential that houses be erected on or near the ground from which the people have been displaced. Part II., dealing with small areas, does not make provision for rehousing compulsory, but the London County Council Committee appointed to deal with this question passed at the end of last November two most important resolutions, which have since been adopted by the whole Council, viz.,—(1) "That housing accommodation should be provided for a number of persons *equal* to that of the working classes displaced by any scheme under the Housing of the Working Classes Act, 1890, or under the provisions of any Improvement Act, but not necessarily in the immediate neighbourhood of the displacement, due consideration being given to the needs of those living on any particular area;" and (2) under Part III. of the Act, which gives them powers to buy land and build thereon for the purpose of increasing the supply of house accommodation, they recommend—"That, apart from the rehousing required in connection with clearance or improvement schemes, the Council do approve of action being taken under Part III. of the Housing of the Working Classes Act, 1890, with a view to the purchase of land and the erection of dwellings thereon for the purpose of supplying housing accommodation."

This committee also emphasise the necessity of building for the poorest classes much cheaper structures than they hitherto have done, and point out that under Part III. their plans do not require to be submitted to any government department, which invariably causes an unnecessarily high standard of work to be adopted.

On examining the rents of the one and two apartment houses they have already built, one is at once struck with the impossibility of the real labouring classes ever being able to pay them; and when I say the "real labouring classes," I mean those whose weekly earnings range from 17s. to 25s. Only in one block am I able to find any houses fitted for the means of such persons, viz., that in Dufferin Street, where a one-apartment house ranges from 2s. to 2s. 9d. per week, and a two-apartment house from 4s. to 4s. 6d. a week, and of these there are only 29 of the former and 23 of the latter. In all their other blocks the rents range from 3s. 6d. to 5s. a week for each single-apartment house, and from 4s. 6d. to 8s. a week for two-apartment houses. These are impossible rents for the great mass of our labourers and poorer classes generally, and I am happy to say we can show a better record than this in Glasgow. It might be said in passing that, through the courtesy of the secretaries and managers of various dwellings companies in London, I have been favoured with much information as to the rents these companies charge for their houses, but only in the case of buildings erected under the Peabody Donation Fund can I find single-roomed houses rented as low as 2s. to 2s. 3d. weekly, and two-roomed houses at 3s. 3d. to 3s. 6d. weekly—the latter, though low, being, in my judgment, more than a labouring man or a poor person in Glasgow can conveniently pay for house accommodation. All the other companies are based upon the plan of returning a full compensation to the capitalist, while providing houses yielding increased comfort and convenience for the labouring classes, and hence it may, from experience, be almost accepted as an axiom that where "full profits" are demanded by the capitalist on the money he lends for the proper housing of the labourer, the labourer must pay a rent out of due proportion to his average income. By the words "full profit" I mean any rate of interest above 4 per cent.

Now, what may be fairly considered the "due proportion" which a labouring man or a poor person should pay out of his

weekly wage for rent? From an inquiry which was conducted by Professor Mahaim in the town of Liege in Belgium, extending over 1,276 representative houses, it was found that while the average household income of each tenant was 17s. 4½d. per week, the average rent paid by each was 2s. 3½d. per week. As this represented a payment by the labourer of 14 per cent. of his wages for house rent, Professor Mahaim stated he considered this proportion too high. In conducting a similar inquiry among the tenants of our ticketed houses in Glasgow, I caused an investigation to be made (1) of the present number of these houses of our poorer classes, (2) of the cubic feet of air space each contains, (3) of the rents paid in each case, and (4) of the weekly wage earned by such households. Of course, it will be understood that the last return, being personal in its character and based on information given by the tenants themselves, allows room for error, yet I believe it is approximately correct.

I think we may claim that the 78,300 persons now inhabiting the ticketed houses are mainly our poorer respectable labouring classes, mingled with that unfortunate residue of drunkards, prostitutes, and ne'er-do-weels generally, which unhappily infest, like a canker-worm, the populous centres of all large cities. There are besides these 78,300 as many as 361,298 men, women, and children in this city dwelling in one and two apartment houses which are not ticketed.

At this present day in Glasgow there are 14,946 single-room ticketed dwellings sheltering about 49,000 inhabitants, and 6,283 two-roomed ticketed dwellings occupied by 29,300. These are the people who sit precariously in their homes, liable as time proceeds to be ousted therefrom by the edict of the Health Committee, or by a future improvement scheme launched and carried out by the Improvement Trustees. The average cubic air space of these 14,946 one-apartment houses is 1,323, or legally sufficient for three adults, or two adults and two children under 10 years old. The average rent paid for these dwellings is 8s. 2¼d. per month, ranging from 7s. 9d. per month in the Central District and in Maryhill, up to 9s. 2d. per month on the south side of the river Clyde.

Ten years ago there were 16,413 of such houses, with an average rent of 7s. 11d. per month.

The 6,283 two-apartment ticketed houses contain, on the average, 1,848 cubic feet of air space, and are rented at 10s. 10d.

a month, ranging from 10s. 1d. and 10s. 2d. in Maryhill and the Central District respectively, up to 11s. 10¾d. in the Western District of the city. Such houses may legally accommodate four adults and one child, or two adults and five children under 10 years of age.

Ten years ago the number of such houses was 6,613, rented, on the average, at 10s. 3d. per month.

All such rents include payment for stair gas and water. These rents, reduced to weekly payments, are respectively—one room, 1s. 10¾d. per week; two rooms, 2s. 6d. per week.

The average household earnings per week of the one-apartment house tenant is found to be £1 0s. 6¾d., and of the two apartment tenant £1 6s. 5½d.

Working out these average figures, we find that our poor are paying 9¼ per cent. of their earnings in the one case and 9½ per cent. in the other for house accommodation. Taking this against Professor Mahaim's 14 per cent. as found at Liege, Glasgow may be congratulated. But we must not deduce too much from averages. We cannot forget that the house accommodation under consideration is of the meanest description, much of it in back lands, where the air is confined and polluted, where light enters only indirectly, and where outlook or window view is restricted to a stone or brick wall from eight to fourteen feet distant. Moreover, the average figures placed as the labourers' income is greatly disturbed by persons found living in these houses who are not poor labourers, but are tradesmen and artizans of the better class, whose household weekly earnings run from 30s. up to 66s. Private landlords do not make any enquiry into the earnings of their tenants, further than to assure themselves, as best they may, that the monthly rent can be paid in advance. Hence we find numerous examples of men and their families in ticketed one-apartment houses who earn such weekly wages, while in the two-apartment houses it is common. It is next to impossible to offer a true explanation of the conduct of men who, with 35s. to 45s. weekly, condemn their little ones to a life in the unwholesome slum. So far, legislation has not forced upon the citizen his duty in this respect to his children. He must not be cruel, the law says; but what more terrible cruelty, prolonged and vitiating both to soul and body, can be imagined than the crime of housing his young in the ticketed dens of the back lands by a

wretch who earns more than enough to give them the inestimable boon of house-room in the free air and sunlight. It is well, I think, that the poet's voice should be heard wailing a warning. In "Locksley Hall" Tennyson cries—

> "Is it well that while we range, with Science glorying in the Time,
> City children soak and blacken soul and sense in city slime?"

Gentlemen, it is not the imagination of the poet that speaks alone. Would to Heaven that it were! But here we are dealing with hard facts—facts of every-day observation—facts patent to every man and woman who chooses to enter the threshold of the dissolute artizan. Well may we ask ourselves, why does legislation tarry? Is science blinded by her own light? Is the freedom of the citizen to be saved even at the expense of the health and lives of his children? While asking ourselves these questions, the greater question looms large and foreboding enough, why are those dwellings existing at all, to which, dismal and unwholesome, these men may drag their wives and offspring? Why are even the poorer labourer and the casual worker compelled by their own or outside circumstances to resort to homes such as we have described, such as may be seen by any of us any day. Such is the question that is ringing at present through the land. It was asked last summer by many voices in Dublin at the Conference of the Royal Institute of Public Health. It was asked last autumn in Birmingham at the Conference of the Sanitary Institute. It was asked last month at the Glasgow Philosophical Society by my friend, Mr. John Mann. In each case the solution of the question was the same, viz., that corporations, municipal authorities, sanitary authorities, must wrestle with the problem, close all insanitary houses, and build labourers' dwellings, light, airy, and wholesome, and rent them at rates within the paying capacity of the poor, and this even at the risk of a deficit, to be made up out of the general rates. Before endeavouring to lay down a basis for the solution of this great problem on lines of experience, and as exactly as the science of land and house rent will allow, I ask your attention to the present position in this city and to correlative facts surrounding the occupancy of the one and two apartment houses here.

In Glasgow there are now, I am informed by Mr. Henry, 69,000 two-apartment houses and 36,000 one-apartment houses, or, in all, 105,000 such humble dwellings, estimated to contain

439,598 of our total population of 700,382 souls. He also informs me that at a very recent survey 1,500 of the former houses and 1,200 of the latter were found unoccupied. But out of this total of 2,700 unoccupied houses only 480 are rented at £6 per annum and under. Putting 10 per cent. of their earnings as the amount labouring men may reasonably be expected to spend in house rent, we find the above number of unlet houses is all that they could find if the authorities, either as Health Committee or Improvement Trustees, closed the doors of their present cheap abodes. Moreover, if we look at the problem sectionally, it is found that any sensible disturbance of these people in certain districts would be calamitous. For example, on the south side of the river there are only 36 such low-rented houses, while in the whole west end of the city, from Buchanan Street and Port-Dundas Road, excluding Maryhill, there are only 82.

These facts show how fatuous it is to speak about the Health Authorities carrying forward meantime a strenuous closing policy until blocks of sanitary dwellings are provided for the people to be disturbed. No one with an intimate knowledge of the remaining slums of the city, and the dark, dismal apartments to be found there, could withstand the conviction that much clearing work still remains to be done, but presently our hands are stayed. Since the year 1890, when special powers were given to the Health Committee to close insanitary houses, about 600 have been closed, and 1,500 persons have been scattered to find such dwellings as they could. But latterly the task has been a painful one, in the face of the appeals of the poor people, and their sad anxiety born of the growing difficulty to find a new house at a rent low enough for their means.

While endeavouring to show that the Corporation should at once proceed to build suitable blocks of labourers' dwellings at low rents, I also wish to clear away any impression that such dwellings ought to be erected for and tenanted by the dissolute and profligate of our lower population. I know that is the notion of some social reformers in industrial housing. A little reflection will show even the most ardent reformer that for those whose habits of life are known and proved to be vicious and destructive, no person, not even a benevolent municipality, can safely provide good and habitable houses. Why should the general ratepayers provide wholesome dwellings for the lazy, the drunkards, and the thieves

among the population and their families? There could only be two reasons, viz. :—1st, because they would, at any rate, be sanitarily housed, and therefore cease to some extent to be a menace to the public health; and, 2nd, they would be so gathered together and placed under supervision that vice and crime would be checked, and the poorhouses and the jails would not be so full, and thus less costly to keep up.

Doubtless the cost to the ratepayers is enormous for hospitals, disinfection, and poorhouses, while to keep our habitual prisoners in jail involves a heavy yearly expenditure. Few perhaps realise the heavy financial burden laid on the city for hospital treatment and disinfection, much of which, though irreducible to a true percentage, is due to insanitary housing. In thinking over this part of the problem I imagined it might be useful to get at the facts. After much labour on the part of my assistants, the following are the facts for the year 1897. Out of a population of 117,763 dwelling in one-apartment houses in Glasgow, 1,019 were removed to hospital suffering from infectious disease, or 86 per 10,000. Out of a population of 321,835 dwelling in two-apartment houses, 2,340 were so removed, or 72 per 10,000; while for all the remainder of the population, numbering 260,784, 1,312 were treated in hospital, or 50 per 10,000. 72 per cent., therefore, of the total removals to our infectious disease hospitals come from the one and two apartment houses, and the cost of keeping and treating them there amounted to the respectable total of £21,837 13s. 11d. It is, of course, impossible to say how much of this large expense is due to the conditions under which our poorer classes are living, but no man doubts that a large proportion of it could be saved were the people dwelling in healthy homes, instead of houses unworthy of the name of homes. Again, from whence come those thousands who fill our poorhouses? Are these not they who come, through misfortune, disease, death, or drink, from the houses we are treating of?

In Barnhill at present there are	- -	1,055
In Parliamentary Road ,,	- - -	1,591, and
In Govan Combination ,,	- - -	571 .
Or a total of	-	2,217 persons,

all drawn from this city, and costing per annum for food and clothing alone the sum of £18,084. How much of this may be

truly laid at the door of slum-land no one can pretend to state, but, on the other hand, it is a certainty to my mind that existence in the cheerless apartments of back-land city blocks lies at the root of a large percentage of poverty as well as of ill health. In fact the former is, among such people, a product of the latter.

From the same class are mostly drawn those who fill our jails. Here also a heavy drain is placed on the resources of the community. Through the courtesy of the governors of Duke Street and Barlinnie Prisons I learn that 19,756 were admitted to these prisons from Glasgow during 1897 under varying terms of imprisonment. As each prisoner costs £2 11s. 10d. per annum for food alone, a simple calculation shows that the common funds for that year were depleted for feeding these persons to the extent of £2,902 13s. Crime closely dogs the footsteps of poverty, poverty follows hard on the trail of drunkenness or disease, and drunkenness and disease lurk most readily and naturally in city areas where the population is packed together in ill-ventilated and dismal dwellings. More we cannot prove, because we have no exact data, but every thinking man realises the terrible facts.

Still, with all this in full view, I do not think a city corporation or any other could fairly be called upon to build houses for drunkards or criminals. If a man or woman, thriftless, careless, and dissolute, will not live the life of a decent, honest citizen, then he or she has no claim whatever to a decent, honest house; and when there ceases to be in our city anything but such houses, these persons must, by the laws both divine and human, fall away into the outer darkness of our poorhouses or prisons until their reformation comes, or flee to some other town where slums continue to exist for their use.

But there are two classes closely mixed up with these I have been speaking about, for whom every municipality should care in the most sedulous manner, viz., the respectable poor who have some furniture, and those who, through stress of circumstances or ill health, have had gradually to sell off their belongings, and are left with little or no domestic stock-in-trade. Of the first class little need be said. They are for the most part the dumb class, fighting with poverty in silence—people whose small houses, ill situated as they are and full of defects, are yet clean, and often bright with plates, cups, saucers, and cheap glasses shining on the

shelves. Only when closely pressed are their poverty and complaints made manifest, and, painfully aware of their circumstances, and grieved at the rowdiness of neighbours unlike themselves, these "rather bear the ills they have than fly to others that they know not of." Of the second class a few words are necessary, because they are a recent growth in Glasgow, creatures of sad circumstances, often of their own making, but, nevertheless, inexpressibly sad. When, through death of the breadwinner, or his prolonged illness or failing health, or loss of steady employment, or, as often happens, through the drunken habits of one of the domestic partners, the scanty furniture melts away into the pawnshop, the family stand on the very verge of poverty. They cannot get a house, they have little or nothing to put into it, and consequently they fall into the hands of the house-farmer, who is the small capitalist of this unfortunate class, and who demands full—very full—profits for his accommodation. A hasty survey of the city recently revealed the existence of 366 separate houses of this class, lodging 1,680 of these, the poorest of the poor. What is going on is as follows:—A house-farmer rents a whole building from the owners at rents averaging about 7s. 6d. per month per single apartment, and puts into each apartment a bed, bedding, grate, fender, kettle, pots, a frying-pan, a table, two chairs, cups and saucers, plates, knives and forks, spoons, oil lamp, a jug, a pail, a basin, a scrubbing brush, a shovel, and a few other odds and ends. Several inventories have been taken of such furnishings, and a liberal estimate of their total value would be forty shillings per set. These furnished apartments are let to the sub-tenants at 5s. per week on the average, paid in advance. Now, I am going to assume that the farmer requires to refurnish each such house every six months, which would cost him 80s. per annum, which, added to his average yearly rent for it, would bring his yearly expenditure up to 170 shillings per room. For this he draws at the rate of 260 shillings per annum, which returns him 53 per cent. on his outlay. If this be not usury, levied on the poorest and most unfortunate of our free population, I don't know what it could be called. Of course, it is admittedly a risky business, requiring constant personal oversight to prevent destruction and moonlight flittings in many cases, yet, withal, it involves these people in a mesh, out of which, once caught, they can hardly hope ever to escape, and completely bars the way to their possessing

again, without benevolent help, the means to furnish a home of their own. I hardly require to point the moral of this tale to the large-hearted and benevolent among our wealthy citizens, and so I leave it.

We now come to the main question, viz.,—Can sanitary dwellings for the labouring classes be erected and rented to them at a *tenth part* or thereby of their total earnings without involving the undertakers in financial loss? To answer this question we must not theorise, but take such experiences as are afforded us from well-known blocks of such houses existing in the city. I have accordingly selected nine blocks of tenements belonging to three classes of owners, viz.,—three belonging to the Corporation; three belonging to the Glasgow Workmen's Dwellings Company; and three belonging to private proprietors. These it will be convenient to number 1, 2, and 3 for the first, 4, 5, and 6 for the second, and 7, 8, and 9 for the third. In order to solve the problem and keep in constant touch with the labourers' wage, I have reduced everything to the level of a weekly rent, and, further, for purposes of strict scientific comparison, I have abandoned the varying unit of the house, and have taken in every case the unit of 1,000 cubic feet of free air space in each house, which, as you know, is the legal minimum allowed for all houses to be built after 1892. A house for the labouring and poor classes may mean anything from 1,000 to 2,000 cubic feet of space, and as air space to dwell in is the all-important thing for the labourer and his family, it is on this basis my inquiry rests. It will become obvious as we proceed that what are the facts about 1,000 cubic feet of house room are the identical facts about the whole house, about every house in the various blocks, and also about the whole block of houses dealt with. It becomes in each case simply a matter of multiplication by the number of available cubic feet in any part or in the whole, and by the number of weeks in a year, to arrive at the exact sum paid or due under each heading. It will be plain to all that to buy or build house property and rent it to tenants so that no immediate loss will result, four main conditions must be met. Provision must be made for meeting (1) the ground rent; (2) the interest on cost of building; (3) the outlays for management, owners' taxes, and fire insurance; and (4) for actual repairs on the property. Anything which is left over after discharging these obligations may

be used to meet future loss due to property depreciation, which may be called a sinking fund, a redemption fund, a reserve fund, or other suitable name, and what thereafter remains may be justly deemed available as profit or surplus over and above the bare interest a corporation or society or individual has to pay the capitalist for borrowed money. It is evident at the threshold of the inquiry that we must fix two things, viz.,—our standard of ground rent and our standard of *bare interest* on building capital. It matters little for the future usefulness of the rent diagrams and tables attached hereto what standard we adopt, as additions or deductions per 1,000 cubic feet per week can easily be made from any given basis, but for purposes of exact comparison these two must be laid down on parallel lines.

Now, first, as to ground rent, I have taken each site as costing 30s. per square yard, and the ground burden or rent, to be covered by rents chargeable on the tenants, at 3 per cent. on the cost of the total site at the above rate. Building rent, or the bare interest on the total cost of the building, is put at $2\frac{3}{4}$ per cent., because the City Registrar informs me that the Corporation can borrow all it needs at this rate. The cost of the respective buildings themselves represent the exact sums paid for them, and in the case of those mentioned in the tables belonging to private proprietors, a very liberal valuation has been put on them all.

It will probably be of considerable interest to you all as future property valuators to know that, in developing the calculations, I find that in the old properties, containing one and two apartment dwellings, the available cubic space for living purposes comes out at between 52 and 53 per cent. of the total over-all cubic measurement. That is to say, for every 1,000 cubic feet of free air space a labourer gets to live in, 1,923 cubic feet are absorbed in building from the ground level to the ridge of the roof.

With these explanations we can now examine the properties selected, and compare results.

Let us take first Nos. 1, 2, and 3, belonging to the Corporation. No. 1 contains 48 houses of one apartment and 12 houses of two apartments, is a four-flatted block on the balcony system, and is built of bricks. Here the two-apartment tenant pays as rent per week for each 1,000 cubic feet, $14\frac{3}{4}$d. (Please recollect that all

rents now to be spoken of do not include police rates, School Board rates, nor poor rates, but do include payment of water and stair gas light.) Each one-apartment tenant pays as rent for similar space 14·404 pence per week, or nearly 14½d. Splitting these weekly rents up, we find the one-apartment weekly rent per 1,000 cubic feet charged with the following. viz. :—For ground rent, 2·2175d. ; for interest on building, 7·15d. ; for management, owners' taxes, and insurance, 2·706d. ; and for actual repairs, 1·208d. — leaving a surplus over 2¾ per cent. on buildings of 1·1225d. Similarly the figures for the two-apartments rents per 1,000 cubic feet per week are, respectively, 2·27d., 7·296d., 2·752d., and 1·236d., leaving as surplus 1·186 pence per week. Now these conjoined weekly surpluses per 1,000 cubicfeet per week, multiplied by the total cubic space in the two classes of houses and by 52 weeks, amount together to £29 12s. 9d., or nearly ½ per cent. on the building cost, and together with the bare 2¾ per cent. interest to nearly 3¼ per cent., or exactly £3 3s. 10d.

Therefore, at the very entry of our enquiry we have a block of buildings which almost meets what we are looking for, viz., a self-sustaining labourers' property rented within the labourers' means. It may fairly be said that a half per cent. is not enough to meet contingencies and depreciation, nor is it, even with a corporation financing, but, on the other hand, it must be taken into account that the cost of these buildings was £6,738 9s. 4d., or 6d. per cubic foot over-all measurement. Here I join hands with the Committee of the London County Council in deprecating such high standards of construction and material. Government and municipal standards are in the main good and desirable, but infinitely more important and useful for the poor labourer are good accommodation and low rents; and, in my opinion, where the former makes impossible the latter elasticity must be found in construction, as there is none in the poor man's ability to pay. Here is the point where the architectural craftsman comes in— where his special knowledge and skill may be employed with the greatest usefulness to his poorer fellow-citizen. The question of greatest urgency is, can a large block of labourers' dwellings of four or five flats be properly erected and completed for less than 6d. per cubic foot, measuring over all? I think it can. Mr. Robert Scott, the well-known measurer, has certified that the four stone-built four-storey tenements belonging to the Corporation in

Osborne Street and King Street were erected and completed in all respects for 4¾d. per cubic foot; that four similar tenements fronting King Street and Parnie Street, with basements 7 feet high, were left finished for 4½d. per cubic foot; and that six tenements of the same construction fronting Parnie Street and circling into Osborne Street cost to complete them the same, viz., 4½d. If this be so, then you will be able to say whether brick-built labourers' dwellings should cost more or less. But I am now going to assume that a building identical with No. 1 belonging to the Corporation can be finished in every respect and left ready for occupancy for the same sum, viz., 4½d. per cubic foot, and ascertain, in that event, what the new surplus over 2¾ per cent. will be. At 4½d. the cost of this building would be £5,053 17s. 1d., in place of £6,738 9s. 4d., which it actually cost; and the interest at 2¾ per cent., £138 19s. 7d., instead of £185 16s. 3d. This would allow of a surplus of £75 19s. 5d., or £46 6s. 8d. more than the actual surplus, or £1 6s. 1d. per cent. for reserve, instead of 8s. 10d. per cent. now available. This one example, therefore, proves that with ground at 30s. per square yard, charged with 3 per cent. interest, and a four-storey block built thereon at the rate of 4½d. per cubic foot, the poorest labourer may have a sanitary and comfortable house on the balcony system for 14¾ pence per 1,000 cubic feet per week, and yield £4 1s. 1d. per cent. of interest on the cost of the building. Should the labourer require that the size of his dwelling be 2,000 cubic feet, he would have to pay 2s. 5½d. weekly for it, or fully 9¼ per cent. on the average wage of £1 6s. 5½d., and 12 per cent. on the lower average wage of £1 0s. 6¾d. Such a house would legally accommodate three adults and four children under 10 years.

I look upon this No 1 property as the best in this city for the labouring man, and think it reflects on our Corporation the very highest credit. I have gone so minutely into the figures here that it will be, I imagine, unnecessary to cover the same extent of ground with each of the others. A study of the tables and diagrams at the end of the pamphlet will reveal in detail their comparative position. I shall therefore deal with them more generally.

No. 2 consists of a block of 36 single-apartment houses in the very centre of the city. The weekly rent for the 1,000 cubic feet here is more than in No 1, being 18·14 pence. The increase is, as you see on the diagram, due to two causes, viz., ground rent

and surplus over $2\frac{3}{4}$ per cent. on building. The total interest yielded here is $4\frac{1}{4}$ per cent., but the rents are more than the 10 per cent. of earnings desiderated, as each house contains 1,832 cubic feet, and hence demands a weekly payment of 2s. $9\frac{1}{4}$d. Block No. 3 is a small property in the Calton district, containing 15 houses of each class, on the balcony system. Here the two-roomed tenant pays 18·520d. per 1,000 cubic feet per week, or $3\frac{3}{4}$d. more than the tenant in No. 1 Block, and no countervailing advantage so far as I can see, while his one-apartment neighbour pays $2\frac{1}{8}$d. less, or 16·339d. The tenants pay more than those in Block No. 1 on every item, excepting for interest on building, and the surpluses over $2\frac{3}{4}$ per cent. are 3·127d. and 2·769d. per 1,000 cubic feet per week respectively, thus leaving the total interest on building cost at £4 1s. 5d. Here the single apartments, being small (1,379 cubic feet), the weekly rent is 1s. $10\frac{1}{2}$d., and hence well within the 10 per cent. limit of the labourer. The two apartments, being 3s. $1\frac{1}{2}$d. per week, are outside of it.

We now come to a consideration of Blocks 4, 5, and 6 of the Glasgow Workmen's Dwellings Company.

The first, Block 4, is a remarkable building, and, as an experiment in the housing of the poorer classes, is of exceptional interest, and the company, under the management of Mr. Mann, deserve the thanks of the community for their enterprise. Here we have two blocks of five-storey buildings, with a fine concreted court between them 61 feet in width. The walls are of brick, built hollow, and rough cast with cement outside. The two blocks contain 8 single-roomed houses and 48 two-roomed houses. There are also one three-apartment house occupied free of rent by a resident caretaker, who is a joiner, working during his spare time on the property, and a suite of rooms or recreation halls, rented from the company by the Toynbee Association. There is a difficulty in dealing with these blocks in a comparative way because of these exceptional extras, but in the following figures I have eliminated from the calculations any rentals derivable from the caretaker's house and from the recreation halls, and have tried to ascertain whether the tenants of the 56 dwelling-houses could pay for everything, and, if so, what extra surplus would be left over to be added to the £110 per annum the company receive for the halls from the Toynbee Association. Under this method we find that the 48 two-apartment

tenants, who pay 18·605 pence per 1,000 feet per week, and the 8 single-apartment tenants, who pay 17·068 pence, can clear off all charges, and leave, per 1,000 feet per week, ·688 pence and ·607 pence respectively. Multiplying these figures by the total cubic feet in each class, and by 52 weeks, leaves a surplus over $2\frac{3}{4}$ per cent. of £14 8s. I find by measuring the above-mentioned recreation halls that, had they been built as extra one-apartment houses, the rental would have been exactly the £110 which the Toynbee Association are paying for them, so that it is quite fair that this £110 should be added to the £14 8s. to arrive at the true surplus profit. This then yields the company a surplus over the $2\frac{3}{4}$ per cent. of £124 8s., which is equal to an additional £1 17s. 4d. per cent., or £4 12s. 4d. per cent. as total interest on the cost of the buildings.

But this, favourable as it is, fails to give a correct comparative figure, as we should take into account a special system of renting inaugurated by this company, viz., that of allowing all good, steady, permanent tenants a bi-annual deduction of two weeks' rent at Glasgow Fair and at the New Year holidays. This makes forty-eight weeks in each year in place of the usual fifty-two. I assumed that all the tenants received this bonus, which reduced my total surplus profit before-mentioned by £30 1s. 6d. Were this special deduction from the rents added, the total surplus would be £154 9s. 6d., instead of £124 8s., or £5 1s. 4d. per cent. of a total interest on cost of buildings, in place of £4 12s. 4d.

I might mention in passing that the company were fortunate in obtaining the ground at about 20s. per square yard, and not at the rate taken for all these calculations, viz., 30s. The one apartments are just under the 10 per cent. limit of the single-room tenants' earnings, while the two apartments are $4\frac{1}{4}$d. per week over the 10 per cent. limit for the average earnings of the two-apartment tenants in Glasgow, which at this ratio should not exceed 2s. $7\frac{3}{4}$d.

Assuming that all these 48 two-apartment houses were let at 2s. $7\frac{3}{4}$d. per week, instead of 3s. 2d., the total interest yielded on the cost of buildings would be £4 12s. per cent., which is ample for any corporation which can borrow money at $2\frac{3}{4}$ per cent. We are, therefore, much indebted to this company for showing what can be done—and done even at 6d. per cubic foot, which is the rate, I understand from Mr. Mann, the buildings came out at for erection and completion.

From our study of these new properties I think I am now justified in saying that in Glasgow the Corporation can erect new dwellings on 30s. ground for the poorest and rent them on a 10 per cent. average earnings' basis, not only without loss, but with a small profit, as by employing a jobbing caretaker and keeping the property in good repair, 1 per cent. is sufficient for a sinking fund.

The full details with regard to the five remaining properties are before you in the tables and diagrams. They are all old properties, and show in every case very full profits to the owners, ranging from £7 3s. 7d. to £9 10s. 8d. per cent. The rents charged are above our 10 per cent. limit of earnings, and I have no hesitation in saying that a great benefit to our labouring poor would and ought to result from a rearrangement of both occupancy and the rentals, so that, firstly, no well-paid artizan would be accepted as a tenant, and, secondly, that the closest approximation possible will be made to the limit herein laid down, viz., rent for one apartment 2s. per week, rent for two apartments 2s. 7¾d. per week. I am glad at this point to have an opportunity of saying that the Workmen's Dwellings Company do not allow any tenants into their houses who earn over 25s. per week. This good example should be followed by all who own very small houses in labouring districts.

Before showing you a few properties and plans on the screen, permit me to draw one object lesson from the diagrams illustrating the position in these five old properties. Looking at these columns and comparing them with those of the four new properties, we see at a glance that whereas the heaviest charge on the rentals of the latter is for interest on building, on the former it is for *profit* to the owners over 2¾ per cent.

Now let us take the first of the five, viz., Block No. 5, and discover what reduction it would make on its total interest were the company to reduce all the rents to the 10 per cent. limit of earnings—that is, 2s. per week and 2s. 7¾d. per week respectively, counting 52 weeks in the year.

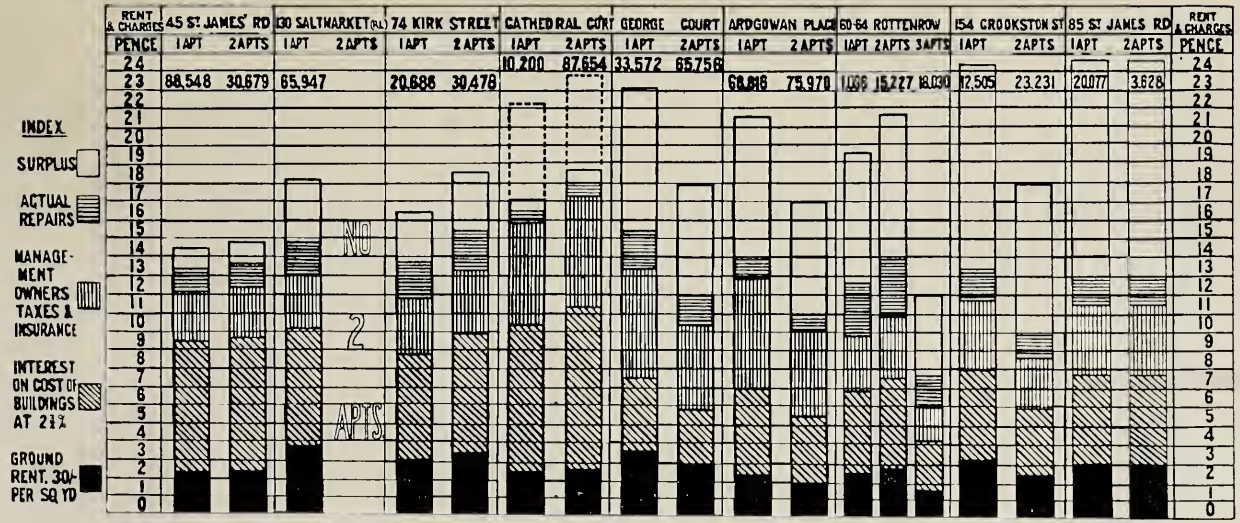
The annual difference of rental we find would be £51 11s. 8d., involving a reduction of £1 19s. 9d. per cent. of interest. But even after deducting this, the total interest on the cost of building would still remain £6 4s. 8d., or almost 6¼ per cent.

And, similarly, a good per cent. would still remain upon the

others were the rents reduced and the capacity of the labourer to pay taken more into account. Meantime it seems clear that, except in a few new buildings, this rent-paying capacity of the poor is not so much considered as the question, what are the rents for similar houses in the neighbourhood? The law of supply and demand in old properties has free play, but this is not fair play to the poor, because neither builders nor property owners are building houses of this small class, and consequently the demand is overtopping the supply. The result of this is only too evident in the very high rents charged. Just glance at the last two diagrams, by which we see the poor inhabitant of the ticketed single room paying over 2s. per week for his dreary 1,000 cubic feet, as against his brother in Block No. 1 at 14½d., Block No. 3 at 16½d., and Block No. 4 at 17d., for houses infinitely superior as sanitary abodes.

If a study of these diagrams and the corresponding tables will eventually lead to the building of sanitary dwellings for the poor by the Corporation, or by such associations as the Glasgow Workmen's Dwellings Company, my labour shall have met with a full reward, and not only will the labourers and other humble citizens rejoice in possessing healthier and happier homes, but the Health Committee will then be able to help, as they cannot now, by working at the opposite end, and closing houses in various quarters of the city which are to-day a menace both to public morality and public health.

DIAGRAM showing the gross rent a labourer or poor person pays weekly for each 1,000 cubic feet in his dwelling in Nine different blocks of tenements in the City, and also how much of this rent is expended (1) for ground rent, taken in each case at 30s. per square yard, and capitalised at 3 per cent.; (2) for interest on the value of the building at $2\frac{3}{4}$ per cent.; (3) for management, owners' taxes, and insurance; (4) for actual repairs on the property; and (5) surplus interest over $2\frac{3}{4}$ per cent. on value of the buildings.



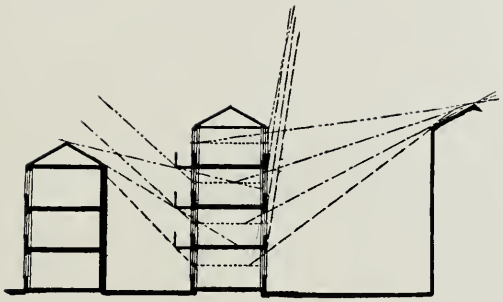


Fig. 1.

This diagram shows a section through the Corporation property at 45 St. James' Road. It exhibits how the balcony shown at the left hand interferes with direct skylight. The point of vision is taken at 5 feet 6 inches from the floor level in each case, and the respective angles of incidence at the window are clearly seen by comparing the one side of the diagram with the other. The angle on the left, or balcony side, is 47° from the zenith, and on the other side 8°. It will be observed that on the ground flat the eye at the window cannot discern any part of the sky, on account of the building situated 20 feet from it. The other side shows a 40-feet street, with an assumed erection of four storeys. While balconies interfere seriously with the light, especially on ground floors, they yield other compensative advantages.

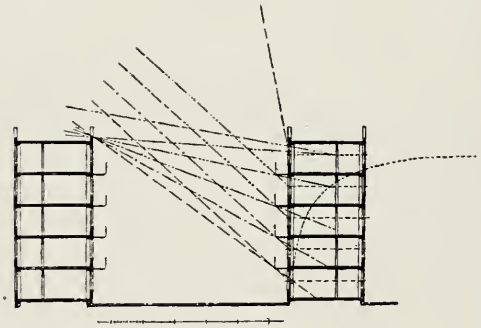


Fig. 2.

This diagram shows the angles of incidence of light in the Cathedral Court buildings, belonging to the Glasgow Workmen's Dwellings Company. The width of the court between the two buildings here is 61 feet, yet it will be seen that on the ground flat the sky just becomes visible within a foot of the window pane. On the upper floors the balcony does not seriously interfere with direct skylight. The curve drawn through the right-hand section shows the point in each flat, at 5 feet 6 inches from the floor, where sight of the sky is lost.

Fig. 3.

This photograph is taken from the back of the Corporation buildings in St. James' Road, and shows the style of the balconies. These balconies might be improved by paving them opposite each window with rough plate glass. This would cost per window, 61s. 3d., instead of 8s. 2d. for concrete. The shadow cast by the balcony is clearly shown on the first floor.

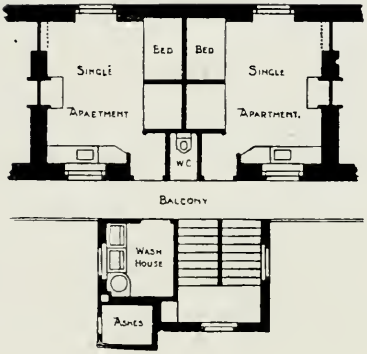


Fig. 4.

This is a plan of the single-apartment houses in the Corporation property at St. James' Road, where each two tenants have a W.C., while the wash-house is used by six tenants.

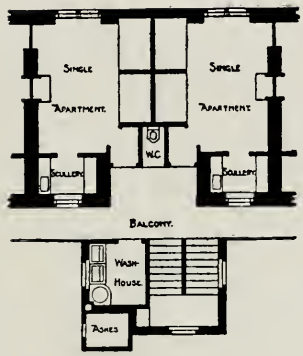


Fig. 5.

This is a plan suggesting an improvement upon Fig. 4. Each apartment is a foot longer, so as to give two full-sized beds, and provide a small scullery separated from the apartment by a 6-foot partition fitted with a door. This arrangement permits of privacy, an essential element in the comfort of single-roomed houses; and, in the case of death, where there are no recognised public mortuaries, would be a great boon to poor people. The situation of the W.C. is also better, as it would not necessitate the user coming out on to the common balcony.

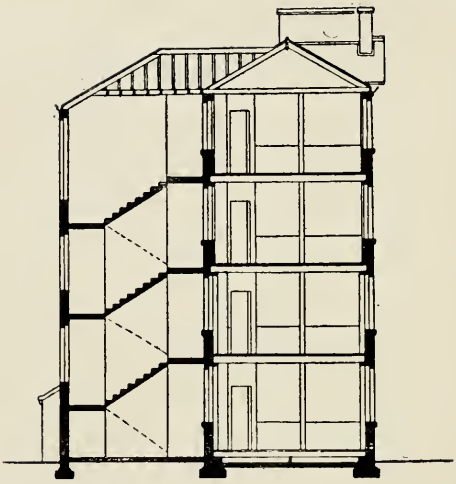


Fig. 6.

This shows a section of the Corporation property at St. James' Road, taken through the staircase.

TABLE comparing cost of ground and buildings, with the gross rentals, of Nine different blocks of Workmen's Dwellings in the City of Glasgow, showing the net surplus after deducting outlays for repairs, management, &c.
All the various ground areas valued alike at 30s. per square yard, capitalised at 3 per cent., and the building cost borrowed at 2¾ per cent. per annum.

	Situation of the Tenements.	Cost of ground at 30s. per square yard, capitalised at say, 3⅓, or 33⅓ years' purchase	Cost of buildings borrowed at 2¾ per annum	Cost of management, &c. Owners' taxes.	Management.	Insurance.	Actual repairs.	Total outlays.	Surplus for a sinking fund and total Surplus.	Total gross rentals.	Number of dwelling-houses of 1 apartment.	Number of dwelling-houses of 2 apartments.	Average cubic feet in each house of 1 apartment.	Average cubic feet in each house of 2 apartments.	Weekly rents per 1,000 cub. ft. in houses of 1 apartment.	Weekly rents per 1,000 cub. ft. in houses of 2 apartments.
	Three belonging to City Improvement Trust.	4,280 square yards at 30s. = £1,920 at 3 %. Annual payment, £57·12·0	Cost £6,738·9·4, at 2¾ Annual interest, £185·6·3	£51·9·10	£16·19·8	£1·17·7	£31·8·6	£344·13·10	£29·12·9, nearly 10/ per cent., or £3·3·10 % over all.	(a) £374·6·7	48	12	Cubic feet. 1,844·750	Cubic feet. 2,556·583	Pence. 14·404	Pence. 14·74
				Total, £70·7·1												
1st.	At No. 45 St. James' Road,															
2nd.	At No. 130 Saltmarket Street (Brick. Back Land),	1,164 square yards at 30s. = £1,746 at 3 %. Annual payment, £52·7·6	Cost £3,326·17·10, at 2¾ % Annual interest, £91·9·9	£33·11·4	£7·3·5	£1·0·0	£24·14·9	£210·6·9	£48·17·3, = £1·9 1 %. or £4·4·4 % over all.	£259·4·0	36	—	1,831·861	—	18·14	—
				Total, £41·14·9												
3rd	At No. 74 Kirk Street, Calton,	770 square yards at 30s. = £1,155 at 3 %. Annual payment, £34·13·0	Cost £2,500·12·2, at 2¾ % Annual interest. £68·15·4	£23·8·3	£11·8·0	£1·12·8	£22·17·11	£162·15·2	£33·0·10, = £1·6·5 % or £4·1·5 % over all.	£195·16·0	15	15	1,379·066	2,031·866	16·399	18·520
				Total, £36·8·11												
	Three belonging to The Glasgow Workmen's Dwellings Co., Ltd.	1,158 square yards at 30s. = £1,737 at 3 %. Annual payment, £52·2·2	Cost £6,656, at 2¾ % Annual interest, £183·0·10	Average of three years, £59·1·2½	£61·15·7	£5·12·6	£15·1·7½	£376·13·11	£14·7·6 (c) +110·0·0 £124·7·6 = £1·17·4 % additional or £4·12·4 % over all.	(b) £391·1·5	8	18	1,275	1,826·125	17·068	18·605
				Total, £126·9·3½												
4th.	Cathedral Court (or Toynbee House),															
5th.	George Court (Brook Street, Mile-end),	1,410 square yards at 30s. = £2,115 at 3 %. Annual payment, £63·9·0	Cost £2,596, at 2¾ % Annual interest. £71·7·10	£46·5·3	£58·15·7	£3·4·5	£37·12·11½	£280·15·0	£141·15·4 (c), = £5·9·5 % additional or £8·4·5 % over all.	£422·10·1	29	34 including 2 shops (small).	1,199	1,934	23·089	17·871
				Total, £108·5·3												
6th.	Ardgowan Place (Bolton Street, S.S.),	1,357 square yards at 30s. £2,035·10 at 3 %. Annual payment, £61·1·0	Cost £4,708, at 2¾ % Annual interest, £129·9·5	£70·18·3	£90·1·5½	£4·6·9	£28·13·6	£384·10·4½	£215·8·7½ (c), = £4·11·6 % additional or £7·6·6 % over all.	£599·19·0	58	33	1,186·482	2,234·411	21·536	16·941
				Total, £165·6·5½												
	Three belonging to Private Owners.	Say 320 square yards at 30s. £480 at 3 %. Annual payment, £14·8·0	Ground and building cost £1,150. Say for building, £1,000, at 2¾ %. Annual interest, £27·10·0	£12·14·0	£5·0·0	£1·0·0	£47·9·6	£78·1·6	£41·6·6, £1·8·7 % additional or £7·3·7 % over all.	£122·8·0	1	9 of 2 apts., and 5 of 3 apts.	1,096	2,175·286 and 2,818 for 3 apts.	19·581	21·642 and 11·863 for 3 apts.
7th.	At 60·64 Rottenrow Street,			Total, £18·14·0												
8th.	At No. 154 Crookston Street, S.S. (Back Land), (Ticketed.)	Say 434 square yards at 30s. £646 at 3 %. Annual payment, £19·7·6	Ground and building cost £1,750 Say for building, £1,130, at 2¾ %. Annual interest. £31·1·6	£15·12·2	£7·5·6	£1·0·0	£10·16·8	£85·3·4	£70·16·8, = £6·5·4 % additional or £9·0·4 % over all.	£156·0·0	10	10	1,250	2,323	24·359	17·881
				Total, £23·17·8												
9th.	At No. 85 St. James' Road (Central District), (Ticketed.)	Say 316 square yards at 30s. = £474 at 3 %. Annual payment. £14·5·0	Say £900, at 2¾ % Annual interest, £24·15·0	£13·6·0	£5·0·0	£1·0·0	An average £6·17·6	£65·3·6	£61·1·6, = £6·15·8 % additional or £9·10·8 % over all.	£126·5·0	18	3	1,129	1,129	24·580	24·580
				Total. £19·6·0												

(a) These rentals all include the payments for water and stair gas.
(b) The rental here is that charged for the dwelling-houses only, and is calculated at 3s. 2d. per week for the two apartments and 2s. per week for the one apartment houses, and does not include £110 per annum paid by the Toynbee Association for the halls, recreation rooms, &c.
(c) This total surplus remains after allowing for the return or abatement of four weeks' rent per annum, given as a bonus to every well-behaved tenant.

TABLE showing the air space in cubic feet, the total rental per annum in pence, and the proportions of such rental paid for (1) ground rent taken at 3 per cent. on 30s. per square yard; (2) interest on buildings at $2\frac{3}{4}$ per cent.; (3) cost of management, owners' taxes, and insurance; (4) actual repairs; and (5) surplus over $2\frac{3}{4}$ per cent.; also, the rent in pence per week per 1,000 cubic feet of air space in houses, paid by the tenants of the one and two apartment houses respectively, and the proportions of said rent paid on account of (1) ground rent taken at 3 per cent. on 30s. per square yard; (2) interest on buildings at $2\frac{3}{4}$ per cent.; (3) cost of management, owners' taxes, and insurance; (4) actual repairs; and (5) surplus over $2\frac{3}{4}$ per cent.

PROPERTY.	Total cubic feet in all houses.	Total cubic feet, 3 apartment houses.	Total cubic feet, 2 apartment houses.	Total cubic feet, 1 apartment houses	Total (*a*) rental per annum of all houses.	Total rental per annum, 3 apartment houses.	Total rental per annum, 2 apartment houses.	Total rental per annum, 1 apartment houses.	Ground rent.	Interest on buildings.	Cost of management, owners taxes, and insurance.	Actual repairs.	Rent per week per 1,000 cubic feet, 3 apartment house.	Rent per week per 1,000 cubic feet, 2 apartment house.	Rent per week per 1,000 cubic feet, 1 apartment house.	Ground rent per week per 1,000 cubic feet, 3 apartment house.	Ground rent per week per 1,000 cubic feet, 2 apartment house.	Ground rent per week per 1,000 cubic feet, 1 apartment house.	Interest on buildings per week per 1,000 cubic feet, 3 apartment house.	Interest on buildings per week per 1,000 cubic feet, 2 apartment house.	Interest on buildings per week per 1,000 cubic feet, 1 apartment house.	Cost of management, &c., per week per 1,000 cubic feet, 3 apartment house.	Cost of management, &c., per week per 1,000 cubic feet, 2 apartment house.	Cost of management, &c., per week per 1,000 cubic feet, 1 apartment house.	Actual repairs per week per 1,000 cubic feet, 3 apartment house.	Actual repairs per week per 1,000 cubic feet, 2 apartment house.	Actual repairs per week per 1,000 cubic feet, 1 apartment house.	Surplus over $2\frac{3}{4}$ per week per 1,000 cubic feet, 3 apartment house.	Surplus over $2\frac{3}{4}$ per week per 1,000 cubic feet, 2 apartment house.	Surplus over $2\frac{3}{4}$ per week per 1,000 cubic feet, 1 apartment house.	Total interest Yielded on cost of buildings.
					Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.	Per Cent.
45 St. James' Road, ..	119,227		30,679	88,548	89,839	—	23,516	66,323	13,824	44,475	16,885	7,542		11·74	14·101	—	2·27	2·2175		7·296	7·15		2·752	2·706	—	1·236	1·208	—	1·186	1·1225	£3 3 10
130 Saltmarket Street,...	55,947	—	—	65,947	62,208	—		62,208	12,570	21,957	10,017	5,937	—	—	18·14	—	—	3·665		—	6·10		—	2·921	—	—	1·730	—	—	3·424	1 4 4
74 Kirk Street,	51,164	—	30,478	20,686	16,992	—	29,352	17,640	8,316	16,504	8,747	5,195		18·520	16·399	—	3·277	2·902	—	6·504	5·759	—	3·447	3·052	—	2·165	1·917	—	3·127	2·769	1 1 5
Cathedral Court, ...	97,854	—	87,654	10,200	93,857 (*b*)	—	84,804	9,053	12,506	43,930	30,351	3,620	—	18·605	17·068	—	2·479	2·274	—	8·704	8·009	—	6·017	5·520	—	0·717	0·658	—	0·688	0·607	(*c*) 1 12 4
George Court, ...	99,328	—	65,756	33,572	101,404	—	61,096	10,308	15,228	17,134	25,983	9,036		17·871	23·089	—	2·683	3·467	—	3·02	3·902		1·579	5·916	—	1·592	2·058	—	5·997	7·746	(*c*) 8 4 5
Ardgowan Place. ...	144,786	—	75,970	68,816	143,988	—	66,924	77,064	14,652	31,073	39,678	6,882	—	16·941	21·536	—	1·725	2·209	—	3·656	4·648	—	1·663	5·934	—	0·810	1·030	—	6·087	7·715	(*c*) 7 6 6
60-64 Rottenrow, ...	34,353	18,030	15,227	1,096	29,376	11,124	17,136	1,116	3,456	6,600	4,488	4,191	11·863	21·612	19·581	1·396	2·546	2·304	2·665	4 861	4·405	1·812	3·306	3·000	1·674	3·111	2·796	1·316	7·815	7·076	7 3 7
154 Crookston Street,	35,736	—	23,231	12,505	37,440	—	21,600	15,840	4,650	7,458	5,732	2,600	—	17·880	24·359	—	2·221	3·025	—	3·561	4·852	—	2·737	3·730	—	1·238	1·692	—	8·123	11·060	9 0 4
85 St. James' Road, ..	23,705	—	—	23,705	30,300	—	—	30,300	3,420	5,910	4,632	1,650	—	—	24·580	—	—	2·775		—	4·819	—	—	3 758	—	—	1·339	—	—	11·889	9 10 8

(*a*) These rentals all include payment for water and stair gas.

(*b*) The rental here is that paid for dwelling houses only, and is calculated at 3s. 2d. per week for the two apartment houses and 2s. per week for the one apartment houses, and does not include £110 per annum paid by the Toynbee Association for recreation rooms, &c. The Police, School Board and Poor Rates have been deducted in every case.

(*c*) These total interests remain after allowing for the return of a bonus to each tenant of four weeks' rent per annum.

THE HOUSING OF THE POOR.

"THE HOUSING OF THE POOR" I selected as the subject of my first Corporation Lecture, because it lies nearest my heart of all the problems of sanitation, and I know it also was a subject in which Councillor Erskine, who invited me to lecture, had the deepest interest. It is due to its selection that I have the great honour to see in the chair our civic chief, than whom no man has done more earnest work (to use his own words) "to fully develop the moral and social advantage of every section of the community." It is the grandest, and yet the saddest, problem upon which the brain and the heart of any man could labour. The problem is not to be solved by recourse to any one particular agency or energy. The present houses of the poor are the product of many evil forces, both positive and negative—forces which have grown and gained force through generations, and which it will take generations to uproot and destroy.

The moral degradation of slum-land must, to a large extent, be met by spiritual influences working through the personal contact of kindly and sympathetic citizens—ministers of the gospel and missionary workers. This influence is what "General" Booth calls "aiming at the heart." The physical side of the problem is that which immediately concerns the municipality; or how are light, fresh air, good drainage, abundant water, sanitary conveniences, houses sound in the walls, roofs, and floors, to be found for every man, woman, and child in our great city, and, when found, how are these things to be maintained inviolate and intact?

It is with a terribly serious and responsible feeling that one goes officially from door to door among the poor of a city

like this. Your head and your heart seem to come into violent collision. We are told by Bailey, the poet, that "We should count time by heart-throbs." According to this chronology I admit to being an old man. The sights I have seen during the past fifteen years, the words I have heard, and the things I have handled, make the heart sore. It is down in the lanes and back lands of a large city one comes into immediate personal contact with "the fretful stir unprofitable, and the fever of the world," and the intellectual part of a man seeks, like Mrs. Greville, to utter a "prayer for indifference." The heart rises in rebellion as scene after scene of poverty and wretchedness follow upon the opening of door after door; it seeks, with indignation and sorrow, for some immediate salvation—for the sudden intervention of some deliverer, almighty to save; but the head points out how impracticable it is to dream of any rapid solution of the awful problem. The heart is torn by the realisation of the sad effects of ignorance, vice, and poverty, and the brain calmly seeks for the causes which produce them, and, in the cool light of reason, reflects upon the remedies to be taken. The heart impels you to become a modern Peter the Hermit, and call with a loud voice for a great general rising of Christian Crusaders to sweep from the city every condition which debases and destroys, no matter what interest may suffer during the battle. The head says, "No! we must work at our statistics, deliver lectures, write sanitary reports, think out schemes of gradual amelioration, issue notices and summonses, and condemn only those insanitary dwellings which are of such an aggravated character as to be quite intolerable." The head recognises the hard, unbending facts which surround the financial aspect, while the heart deplores the necessity for giving heed to the pounds, shillings, and pence of the subject.

It does not take long for any one moving out and in among the poor to note that gross ignorance on their part plays an all-important part in the causation of disease and death among them. This lies on the very surface, patent to

the most inexperienced district visitor. It takes a more experienced mind to apprehend why poverty becomes, in so many instances, the instrument of destruction to health and life.

I desire to-night to deal with both of those aspects, and will seek to ascertain, first, how best ignorance on the part of the poor is to be combated? and, second, why poverty causes destruction? and how the present conditions caused by poverty may in time be abolished?

As a rule, the people we are thinking of to-night walk in complete deafness as well as in gross darkness. Even the glowing periods of great statesmen, whose eyes, from their high elevation, are now penetrating the gloom of slum-land, do not reach their ears. They are, for the most part, all unconscious of the powerful voices resounding throughout the land on the grand necessity for changing the character of their abodes, not only in their own interests, but in the wider interests of the British Empire.

The voice of the personal visitor is what they *do* appreciate. Their knowledge must be got at first-hand, their thoughts must be instilled by the living contact of flesh and blood. I am deeply convinced, after years of thought and experience, that no power that can be brought to bear on the health of the common people is to be compared with the power of the loving, *personal* interest of a man or woman who knows their weaknesses and their legitimate wants.

The main essentials of healthy living, viz., a fresh and free atmosphere around and within the dwelling, unstinted measure of light streaming in at the windows, abundance of pure water conveniently at hand, and sanitary conveniences so situated and kept as to create no offensiveness—are, we often find, least in the minds of the lower-class tenants.

The environment in which they have been born and bred has blinded the majority to the manifest necessity of attempting to secure these essentials. Like the fish in the mammoth-cave pools, they have no sight, they have dwelt so long in insanitary darkness. Filth in some form or other has been in constant evidence so long; semi-darkness has

surrounded them for such a number of years; and stagnant, fœtid air has been the breath of their lives for such a lengthened period, that the women-folk of the poor seem to accept the terrible conditions of their lives as a matter of course. The labouring man's wife does not complain much of the want of these things when you visit her. She and her neighbours, and their families, steeped in ignorance of hygienic principles, constantly remind you of those whom Cowper wrote in his "Bill of Mortality," "Who, much diseased, yet nothing feel; much menaced, nothing dread."

What menaces her convenience and comfort is what your Sanitary Inspectors hear most about. Stinks from the sink, plasterless walls, rotten floors, broken ceilings, and the nightly rambles of the rats; these, and such like, form the burden of her complaint—these appeal to every woman, even the most degraded. She tells you in indignant tones of the unfulfilled promises of the factor's rent-collector to see at once to the necessary repairs. She does not tell you that she uses her sink as a water-closet, or that her floors on many occasions have been saturated with dirty water and used to break fire-wood upon, or that the huge break in her plastered wall is the result of a domestic brawl. The causes have to be guessed at by the wary and experienced inspector, and she and the owner dealt with accordingly. A glance at her and at her house is often sufficient to fix her type—struggling, careful, clean, or lazy, careless, dirty. If the former, matters can be mended and our work made easy; if the latter, our missionary work lies before us, in the prosecution of which every art of persuasion, cajolery, and veiled threat of compulsion are needful to be employed with the nicest discretion. Attack the careless, slatternly woman by threat of instant proceedings, and she at once breaks from sullenness into vituperation —wants to know why you permit her broken walls and flooring to remain; why her ceiling is cracked and bagging; why her window is broken and unhung; and what you intend to do to remove the insects which crawl from myriad hiding-places to their nightly orgies upon her and her wretched children.

This is the kind of case—alas! too common—the inspector finds it difficult to deal with. The house is bad, but so is the tenant. Such a tenant would make any house intolerable to live in within a few months. We may, of course, notify the owner at once to remove the vermin, to repair the plaster, and to refloor the house and rehang the windows; but hitherto we have been unable to find any practical means of dealing with the dirty, degraded tenant, short of expulsion from civilised life.

Here two plans have been tried to combat the joint effects of poverty, laziness, and sluttishness—the Deino, Pephredo, and Enyo of our modern city life. It was recognised early by the Health Committee that among the teeming masses of slum-land the voice of soft persuasion went deeper and wrought surer than the thunder of intimidation—that love was stronger than the law. Six female inspectors were appointed and sent down into the sadness, and wretchedness, and offensiveness of the 30,000 whose dwellings were branded for night inspection for fear of the typhus plague—the Nemesis of filth. These municipal angels daily visit the crowded tenements of our struggling population. Book in hand, they note the condition of the houses of the poor, listen to the complaints and tales of sorrow with patience, and advise in cases of difficulty or distress.

The first thing they did was to gain the confidence of the poor by words of sympathy and small acts of assistance, which need not be described. The main object was, of course, to secure the cleanliness of every humble home; to leave no permanent *nidus* within the four walls for the growth and development of those minute vegetable substances called microbes, which, like other better-known vegetables, thrive best in moisture and rottenness.

Thousands of houses, in the early days of inspection, were seen to be little else than forcing-beds for germs of all kinds, and those tenements, once infected by the specific germ of typhus, smallpox, or other dangerous disease, became not only fever fires within themselves, but, like the flaming fire

in the crowded area, were a constant source of danger to the whole neighbourhood, if not, indeed, to the whole city.

As time proceeded, poverty was seen in numerous cases to be the cause of black walls and soot-laden dirty ceilings, and these, in turn, begot the apathy, the heartlessness, of the lowly housewife. The inspectors were then authorised to pass "orders" to poor persons which secured to them *gratis* as much whiting and colouring powder as were needful, and the loan of a brush wherewith to cover up the dinginess of the apartment. No reasonable excuse was thus left for a continuance of dirt, and, by the exercise of this power of assistance, the ladies are able to influence the better nature of thousands, and secure an obedience and ready co-operation on their part which no threats of punishment seemed able to command. It is not so easy now as formerly to find in Glasgow a really filthy house—a house that can be certified as being a menace to the public health.

At this point might I throw out a practical suggestion, viz., that we might strive to get that word "filthy" in this connection abolished from our Acts of Parliament. It has the great disadvantage of being too strong a term. Under its protecting *ægis*, a great number of houses might, in certain circumstances, escape the corrective influence of the Corporation which should not escape, and their tenants continue under the protection of law to dwell more or less in uncleanness for long periods, living in that extensive borderland which lies between clean and filthy. All houses which are dirty, and therefore unclean, should be cleaned, or the municipality and its officers should know the reason why.

A conciliatory policy has now been established—friendly in its practical application and educative in its aim. In respect of the filthy house internally, poverty in Glasgow occasions less "alarm" than it did in the past. The kindly visit of our ladies has so far abolished Deino, and their lessons and advice to the poor have greatly relieved the city of her sister Gorgons—"dread" and "horror."

No influence on public health and the death-rate is so

malevolent as dirt in the home, on the entrances to the home, and in the immediate surroundings of the home. Once raise the public conscience to this greatest of all sanitary truths, and a brighter future lies in store for every crowded city. Force here seems to be no remedy. Neither Parliament, nor municipality, nor individual judge loves the application of force within the four walls of even the poorest citizen. Only when persuasion, advice, educative influences, and promise of help have failed—only when ignorance has no reason for remaining obdurate—should our police courts be requested to condemn and punish those who, through poverty, weakness, disease, or even ingrained laziness or stupidity, have continued to dwell in dirt and defilement. It is easy to condemn the poor and issue a summons; but it is more noble to get them a water supply, and to educate them, and cause the issue of two pounds of whiting and a whitening brush where want of such is one of the causes of complaint. But the persuasive, educative method absorbs much time and patience. House-to-house visitation and revisitation simply swallow time, and men or women are needed for this work in every city much in excess of the present numbers for any real effect to be noticeable on the public health.

Were it practicable for every small house in the crowded localities of this City of Glasgow to be visited regularly once a week by a trained, tactful, and intelligent inspector, male or female, what a change could be effected in the homes and in the immediate environment of the people! What a reduction could eventually be made in the disease and death-rates! As matters stand a visit once in two or three months is all that can be accomplished, so large are the fields and so few are the labourers. "Like angels' visits, few and far between," are the calls of the inspectors in the houses where their presence is most required.

Quite recently I have suggested the permanent employment on the sanitary staff of half-a-dozen inspectors as a "flying squadron," whose duty it would be to invade, in turn,

all our most insanitary areas; take street after street, land after land, house after house from bottom to top, and compel owner and tenant alike to abolish, within the area of inspection, everything in the form of dirt and nuisance. There are certain districts which may be clean to-day and dirty to-morrow; and although the absolutely filthy house is now difficult to find, although the standard of cleanliness has been raised all round during the past twenty years, still we have a great deal of that general carelessness and untidiness, that want of free ventilation, which makes the visitor to the poor often exclaim, with Coleridge, "I have counted two-and-twenty stenches, all well defined, and several stinks."

I have hopes that before long we may see such a valuable permanent addition to our department.

When we consider who are the principal sufferers from this state of matters; when we think of the dreadful infantile mortality which blackens the statistical pages of every important municipality; when we know that in the poorer quarters of a city a fifth of those born never see another birthday, our feelings of pity become stirred to their depths, and we ask ourselves, Can nothing be done more than is done to save the helpless? It is here that ignorance commits the greatest havoc. Milk, the most susceptible of fluids, in the heavy, fœtid atmosphere of the dirty, unventilated house, becomes "turned" in a few hours; and what is under cool and clean conditions the sustaining power of infants, becomes to them, if kept amid filth, a veritable poison.

Again, most of our poor burn oil lamps in the squalid rooms, because it is cheaper than gas; but they do not know that by doing so they are largely increasing the amount of organic matter in the air they breathe, beyond what would occur were gas the illuminant.

I have spoken of the want of free ventilation in these houses, and it needs to be spoken about again and again. The destructive power of used-up, vitiated air is incalculable. It decimated our soldiers until the Barrack Improvement Commission issued their famous report in 1861, which

resulted in each man getting 600 cubic feet of space, and a minimum height of ceiling of 10 feet. Since that time the great mortality among our troops has steadily diminished; and the great mortality among our poorer civil populations from disease of the respiratory organs will not—nay, cannot—be sensibly reduced until some drastic measures are taken to secure for them a greater measure of fresh air and ventilation than they have at present. Unfortunately, we dare not take drastic measures. We cannot give our labouring man sufficient air-space. He cannot afford it and live, if he be a married man with a family. But we ought to be able to compel him to let in air to his dwelling, which, in thousands of cases, he declines to do. His windows are completely under his own control, and too often both sashes are kept carefully closed. The result is, the atmosphere is close and oppressive, and in certain cases is so laden with organic matter that even the open lobbies leading to the houses are sensibly affected. When spoken to, he or his better half invariably state they have "ower much cauld air in the hoose already," and it would be quite useless to endeavour to convince them that to be "cosy and clarty" (to be warm and stuffy) is of the deadliest import to them and their children Constant and free ventilation from the window should be enforced in the public interest; but the problem of enforcement is a difficult one, and the present legal standard of cubic air-space to a great extent renders it, in numerous cases, insoluble.

This leads me naturally into the second part of the subject, viz., Why poverty is to such a great extent the instrument of destruction to health and life. Several reasons at once occur to us. There is insufficient and improper food, a too great indulgence in strong drink, a want in numerous instances of warm clothing, a scarcity in winter of fuel—all of which deeply affect the vital forces of those in very humble circumstances. But, above and beyond all these terrible drawbacks to the rearing of a strong and healthy labouring population, there stands out prominently this factor—for the

existence of which the governing authorities are mainly responsible—that, structurally, the cheap houses in which thousands of our poor are forced to dwell, and their surroundings, are not in a truly sanitary condition.

The questions may be asked by some ingenious person—How should this be? What does the existence of Local Authorities, Medical Officers, and Sanitary Inspectors mean, if not to prevent any house, however humble, being a curse to its occupant, entailing upon him and his family, as time proceeds—

> "The young disease, that must subdue at length,
> Grows with their growth, and strengthens with their strength?"

The questions are cogent, the answers not easy. One thing is certain, and that is, that the living past is burying the present dead. The sins of the fathers are being visited upon the children unto the third and fourth generations. The growth of villages into towns, and towns into cities, has proceeded until quite recent times upon lines of expediency and ignorant selfishness. The science of sanitation had no place in the feuing and building of a hundred years ago. Untold misery is now the result. Those responsible for the narrow streets, lanes, and courts formed by our present rookeries—those who planted a rookery on the natural breathing space belonging to the tenement in front of it—are long since dead. In many cases their heirs have sold the "abominations" to ignorant unfortunates, tempted by the heavy rent roll, or have managed to secure full bonds over the subjects from persons unskilled in property, and less skilled in reading the signs of the times. So involved, so inextricable have the financial relations become in connection with the possession of slum property, and so clear is it that many of the present owners have no possible family connection with the original holders of it, but are often women, and even children, eking out a subsistence upon the rental, that Government, Sheriffs, and Local Authorities deal tenderly with the whole subject of its demolition, and even the closure of a large part of it from human habitation. Medical Officers and Sanitary Inspectors

may pounce here and there upon a house under the Public Health Act or a Local Act, and have it closed up; but they feel, in a city at any rate, that such action is like unto the nibbling of a mouse at the strands of the gigantic cable net which has entrapped the lion. Such action severs a strand here and there; but a lifetime of such actions does little to set free the British Lion from the thraldom which the network of insanitary property has cast around him in every important town in the British Isles.

Now, what is the main cause of this state of matters? It has been called, "No room to live!" I call it, "No sanitary rooms to live in." Go down with me into some of the noisome slums which shortly I will show on the screen. Enter these dark hovels, whose tenants grovel in eternal twilight, varied in the winter season by the flame of the paraffin lamp. As you draw your hand along the damp wall, and feel the blistered and rotten plaster crackle and fall in pieces to the floor, you stand up ready to pass sentence of condemnation. You look at the tenant, and probably some of her progeny are squatted at your feet. A few questions reveal the deep pathos of the situation. "Oh! sir, I hope you're no gaun tae pit us oot, the hoose is no sae bad; my man's been oot o' work, and we're behin' wi' the rent; hooses are awfu' scarce, and we canna afford a better ane." The certifying officers appear to such an one as destroying angels. She knows nothing of the great necessity for summary condemnation in the public interest, she only knows her poverty and despair—she only knows there are no selection of houses for her and hers. It matters little what are the proximate causes which keep her in this place at 6s. or 7s. a month. It may be misfortune or loss of work, it may be prolonged illness, it may be drink; the great fact for her is, that there are no sanitary houses at that rent within half-a-mile of her. Nothing is more painful in the line of sanitary duty than putting one's signature to a certificate of eviction in such cases. It may not be any concern of ours where such wretchedness is to find a dwelling; we may still

our hearts by the apparent reasonableness of Cain's query, "Am I my brother's keeper?" and try to persuade ourselves that, after all, it will be a blessing to those poor children we see if they are removed from such evil surroundings, no matter whither; but the task is hard, and yearly becoming harder, in the absence of suitable abodes.

Private persons will not build to house poor people. Poor-houses do not meet the cases that are not quite destitute, though poor, and so such folk are worse off than the almost destitute in all respects but the possession of liberty. It must be stated that freedom of will to do as they like keeps thousands of our "submerged tenth" in the hovels they inhabit. This is an undoubted and proven fact of civic experience, and the realisation of it "puzzles the will" of even the most progressive of our reformers in industrial housing. That "eternal spirit of the chainless mind" instils within the bosom of savage and civilised alike the feeling to which Pope gave expression—

> "Give me again my hollow tree,
> A crust of bread and liberty."

Again and again I have experienced the truth that this spirit dwells within many of the rotten dwellings of Glasgow. Many of their inhabitants do not want anything that savours of regulation in their habitations or in their conduct. If the great majority of our slum dwellers showed a tendency to become amenable to certain more or less elastic rules as to occupancy, cleanliness, regularity, and general behaviour, half the difficulty of their housing would disappear. But they do not want to feel restraint of any kind; no prying caretaker, no inquisitive janitor, must be near to note the brawling house, or the midnight wanderer staggering to his door. So you can easily perceive that any very extensive scheme of building for these folks, carried out, say, in the outskirts of the city, even with free tramways to their doors, might end in financial disaster. Still, after most careful enquiry, I am with "General" Booth in his opinion that about 50 per cent. of them are respectable; and what I mean by "respectable"

is, that, with many egregious faults and weaknesses, at least half of our poorer classes wish to be in a position to live clean, wholesome, sanitary lives. How is this to be accomplished in a city such as ours, where unsavoury conditions in many directions abound?—a terrible legacy of the private selfishness which was allowed scope and development 40 or 50 years ago.

Much has been done during the past 20 years to ameliorate the state of our humbler classes. No one knows more of this grand work, nor has done more for the poor, than our Chairman. In one direction alone—that of providing proper sanitary conveniences—not less, I am sure, than £120,000 has been spent by proprietors in that time; and the supply of sinks and water in thousands of houses which formerly had none has also been proceeding quietly, much to the joy and comfort of those recipients who in previous years had to share with four or five others the abomination known as a "jawbox" on the stair landing, and a common privy in the court. Of course, rents have gone up accordingly, but I have invariably found that the extra sixpence or a shilling a month is not grudged for the great boon of a private sink, and the use of a convenient water-closet under lock and key. None but those who have spent days in the slums can adequately realise the difference it makes when an ashpit can no longer with truth be called a midden. To be in one of these midden-courts when the satellite of cleansing is busy at his operations can only compare with the experience of poor Falstaff in Mrs. Ford's buck-basket, "That *there* is the rankest compound of villainous smell that ever offended nostril." The midden, even in its undisturbed state, if the weather be mild, "smells to heaven" every hour of the day, and no housewife with any remnant of an olfactory nerve will open her window if it be 15 feet from it. Many courts in our city, I regret to say, are still disgustingly odorous and unhealthful. Where poverty dwells, human progress is slow. It seems to be one of our social necessities that, in the struggle for a sanitary existence, the poor must attain to

what is needful only through official action overthrowing the selfishness of individualism. Our present curse in this city is that, as a rule, the private owner of slum property won't move except under the first lash of the law. He wants an official notice. He does not seem to see that the voluntary spending of money upon such sanitary improvements as I have indicated would do much to save his property for years against a more drastic law which, in its present condition, is hourly hanging over it. I have no hesitation in addressing such, as Conrade addressed Dogberry, the City Officer of Messina—"Away! you are an ass!"

A slum without modern sanitary conveniences is a very different thing from a slum or closely packed area with water-closets, sinks, and water supply in each house, and well-paved courts. For the former, early condemnation is sure; for the latter, expectation of life is increased by tenfold.

As to the Corporation building labourers' dwellings in various parts of the city I have already, in a lecture last year, given my opinion. I then went as carefully as I could into the facts and finances surrounding the erection and control of large blocks of this class of property held in the City of Glasgow both by the Corporation and by private owners. From these figures it can be easily proved that a modern and comfortable house, containing 1,600 feet of free space, in a block or tenement, and the use of sufficient land for a court or back green, with washing-house, water-closet, &c., can be rented to a labourer without loss for 1s. $11\frac{1}{4}$d. per week.

It is rather a strange coincidence that this sum, or £5 per annum, is exactly the rent which is being paid on the average at the present time by the tenants of single apartments in the back lands of our city, but in their case this payment is for 1,250 cubic feet, instead of for 1,600.

We hear much in these days as to the solution of the problem—"How can the labourer, working-man, poor person, or any individual earning from 18s. to 25s. per week, obtain the tenancy of a sanitary house at a rent within his means,

or about ten per cent. of his weekly wage, without loss to the proprietor?"

The problem has been put differently by different persons. For instance, here how it is put by the Right Hon. A. B. Forwood, M.P., of Liverpool. He says—"The problem to be solved is, how best can we accommodate the industrial classes at *a rental of one shilling per week per room?*" After putting it thus, he proceeds—"This shilling rental is the all-important factor, for no man with a family ought to occupy less than three rooms, and 3s. is as much as the average Liverpool workman can afford to pay. 3s. per week returns £5 per house per annum to the owner, and no private person will build cottages costing £150 upon such a return."*

The problem set in this way seems to me, however, to be too vague as to accommodation, and to imply rather much as to the necessities of the case. What is a room? must always be a question, and it is also a question whether the labourer needs a cottage with three rooms. If the labourer requires a cottage of three rooms, then his proper housing is, from an economic point of view, impossible, unless he is obtaining financial aid from some members of his household. I make bold to assert it cannot be done, even were he to get his ground for nothing. What, on the average, does the labourer require to dwell in? From a very recent enquiry into his actual necessities in Glasgow (which enquiry comprised 5,500 houses), I find that here each family occupying a one-apartment house number $3\frac{1}{2}$ on the average, and in the two-apartment houses there are $4\frac{1}{2}$; so that in the first case, at our present standard of occupancy, or 400 cubic feet for adults, and 200 for children under ten, the occupiers of our present one-apartment houses require 1,400 cubic feet of air-space. At the same ratio the tenant of the two-apartment house occupies, I find, 1,800 cubic feet; so in presenting the following facts before you, I have taken the mean between these two, or a house of 1,600 cubic feet. This allows for the father

* Paper on "The Housing of the Working Classes," by H. Percy Boulnois. *Journal of the Sanitary Institute*, Vol. XV., Part IV., page 620.

and mother, and four children under 10 years. Let us carefully enquire how such a family can be housed at the rent I have named, viz., 1s. 11¼d. per week, which may be taken to represent one-tenth of the worker's weekly wage.

In offering you some brief calculations on the subject, I shall not depart from actual experience, but will base all I am going to say on figures taken from four well-known properties in the city. These are—(1) the Corporation property at 45 St. James' Road; (2) their property at 130 Saltmarket (back land); (3) their property at 74 Kirk Street, Calton; and (4) the property of the Glasgow Workmen's Dwellings Company, Limited, at Cathedral Court, in Rottenrow.

On consulting the lecture I delivered last year on the Housing of the Labouring Classes, I find that the tenants of these four blocks of houses pay exactly 11s. 10d. each per annum per 1,000 cubic feet occupied, as ground rent, estimating the cost of the ground to have been 30s. per square yard, and the interest required on the price of the ground 3 per cent.

Similarly, the payment by the tenants yearly for interest, at 4½ per cent., on the cost of these four blocks, I find to be £1 10s. 10d. per 1,000 cubic feet occupied.

Now let us capitalise these two sums, viz., the ground rent, 11s. 10d., at 3 per cent., and the building rent, £1 10s. 10d., at 4½ per cent. I assume here, you will notice, that it would not be reasonable to charge the tenants with more than 3 per cent. on the price of the ground, as ground does not, as a substance, depreciate, and so does not require to be redeemed, therefore no sinking fund nor reserve fund is necessary to be provided. On the other hand, 4½ per cent. is charged against the cost of the buildings, made up by 3 per cent. to the capitalist and 1½ per cent. for sinking fund and reserve.

The first sum amounts to £19 14s. 5¼d., and the second sum to £34 3s. 4d., which sums may be safely expended for ground and for building for every 1,000 cubic feet of free air-space given to the labourer; or, taken together, a total sum of £53 17s. 9¼d. per 1,000 cubic feet.

I find that the experience gained at the four properties I have named shows that 4¾d. is required per 1,000 cubic feet

occupied per week to cover management, taxes, insurance, and repairs. What we find, therefore, is—(*a*) that a capital sum of £53 17s. 9¼d. per 1,000 cubic feet of living space *must not be exceeded for land and building;* and (*b*) that, for the same space, 4¾d. must be charged per week as above on each occupier. It is now a simple count in proportion to discover that the tenant of 1,600 cubic feet must pay 1s. 11¼d. per week for his accommodation, so as to leave the Corporation or other proprietor free from risk of loss so far as he is concerned.

These facts, drawn from our own experience here, show how illusory it is to put this problem on the idyllic platform of the three-roomed cottage for our labourer at his present wage. It is, like "the poet's dream," alas! too beautiful to be true—too high to be attainable in this interest-loving, money-grabbing world. I am, I admit, not one who believes the present-day labourer in our country can pay unaided 3s. per week for his lodging, or that private owners can house them healthily at or near one-tenth of their income. I agree with Mr. Boulnois where, in the lecture previously referred to, he says—"The dilapidated and dirty condition of the tenement blocks which are in the hands of individual owners, and the great losses which those owners undoubtedly suffer from low-class and unmanageable tenants, seem to point to the conclusion that such blocks should be owned and managed by powerful bodies, companies, and corporations, who could, and would, keep both the buildings and the tenants in fairly decent order. The cheapest of cheap dwellings are unquestionably wanted; they can only be supplied by the strongest of strong hands."

The truth of the above assertion has quite recently been proved in Glasgow by the erection of ten tenements, consisting of 68 single and 85 two-roomed houses, in Carntyne Road, Haghill. The Corporation entrusted the designing of this important block to Messrs. Frank Burnet & Boston, architects in the city, who inform me that the whole has been completed, with water-closets, washing-houses, &c., at the low rate of 4·1 pence

per cubic foot overall measurement. The cubic measurement is 829,514 feet, and the total cost £14,425, of which £243 was spent in underbuilding, which, from the peculiar character of the site, was found to be necessary.

The two-apartment houses vary in size from 3,426 to 3,548 cubic feet, and the single apartment I measured came out at 1,735. The monthly rents of the two former dwellings are respectively 15s. 8d. and 16s. 8d., including water rate and stair gas, or at the very low rate to the labourer of 1s. and 1s. 1¼d. per 1,000 cubic feet per week. These are the lowest rates for good sanitary houses in this city, if not in the kingdom.

The monthly rent of the single-apartment house above referred to, including water and stair gas, is 9s. 10d. per month, or 1s. 3¾d. per 1,000 cubic feet per week, which is only beaten by the Corporation single-roomed houses at 45 St. James' Road, where the rate is 14·4 pence (this property is on the balcony system).

Houses of a similar class in the immediate vicinity owned by private proprietors come out at 1s. 3¾d. per 1,000 feet per week for the two-apartment houses, and 1s. 7¾d. for single apartments; or, say, 3d. per 1,000 per week more in the one case and 4d. more in the other, or differences of £2 5s. and £1 9s. 5d. per annum respectively.

As these dwellings have quite recently been occupied, it is not possible to present a complete financial statement, but I have no doubt there will be a balance on the right side.

Lord Provost Chisholm, in his lecture before the Philosophical Society at the close of 1895, touched upon the vital question of who among us benefited or would benefit by schemes of improvement and the sanitary housing of our labouring classes, if these are to be carried out by the Corporation in the future. The question seems to be answered by another question—Who all are at present suffering, both in pocket and in amenity, from the sad state of our present slums? Who pay the £42,824 expended annually in Glasgow for our sick poor and destitute in

hospitals and poorhouses, and our degraded ones who regularly do their dreary days in jail? Every inhabitant suffers, be he landlord or tenant, and he most who is unfortunate enough to be both. Consequently, it seems to me, in this broader sense, every upright citizen, apart from Christian impulse or hygienic considerations, should rejoice to bear his share of the work of radical improvement, if this work would tend to reduce the yearly drain on our resources to which I have just alluded.

I do not think there can be divided opinions as to the final result of a sweet and wholesome city. The ill-regulated lives—whose actions eventuate in destructiveness, disorder, and filth—would disappear when their present habitations were no more. No landlord, no company, no corporate management, would take them in, nor have anything to do with them. The sanitary city would be no city for them, and in it, I believe, the dread we at present experience in the face of epidemics would be for ever banished.

But that appears as yet only as a prospect in the distant future. The Glasgow Corporation has done great deeds, and even now is in the midst of uprooting slums, and rebuilding homes of comfort and health for the people. We all rejoice in this, and I am sure the majority of us are prepared to believe that, by the constant steady pursuit of a sanitary building policy for labouring people, the Corporation and its democracy will become more and more united in the furtherance of the vast municipal enterprises which are foreshadowed. The Corporation as the careful, judicious landlord, and the labourer as the thrifty, law-abiding tenant, would bring about a "consummation devoutly to be wished," and establish an economic transformation, which would tend not only to bind their interests together, but also to inspire both with a zeal to see our great city one of the most progressive and among the healthiest in the empire.

8th December, 1900.

BACK LANDS

AND

THEIR INHABITANTS.

BY

PETER FYFE,

CHIEF SANITARY INSPECTOR OF GLASGOW.

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1901.

THIS Paper is respectfully inscribed to Dr. J. B. RUSSELL, late Medical Officer of Health for Glasgow, whose luminous lectures upon kindred subjects, and brilliant Health administration in the City, have served as inspiration to his humble admirer and friend,

PETER FYFE.

24th April, 1901.

"Is it well that while we range, with Science glorying in the Time,
City children soak and blacken Soul and Sense in city slime?"

BACK LANDS AND THEIR INHABITANTS.

BACK LANDS!—ominous words, full of deep meaning to the sanitarian—are in all large cities too often synonymous with darkness, decay, death.

The words "back lands" are a parting legacy left to the citizens of Glasgow by her late Medical Officer of Health, Dr. J. B. Russell. Before leaving us he indicated very clearly that the future improvement of our city lay in the removal of many back lands, which, in this twentieth century, still remain to darken and curse our civic life.

I have ventured to address your Association* upon this all-important subject, because I believe it is the question of the hour, and to prepare your minds for the inevitable condemnation which must sooner or later fall on those relics of past private greed and public neglect. The position of the house factor relative to insanitary blocks of such dwellings is quite well understood. He is the administrator for somebody else—the real owner—and his duty is one of the most difficult it is possible to conceive. For although a factor, as such, must leave no stone unturned to so administer as to return a reasonable interest to his employer, he is, as a man—as a private individual—I have good reason to believe, quite sensible of the assimilating influence upon his back-land tenants of dark and dismal habitations. There are few house factors in Glasgow to-day who, in the dual capacity of manager and private man, will defend back-land properties, and maintain that they are for the people the right homes in the right places.

As managers, partly responsible for the housing of the poorer class of tenants, what are your arguments for their continued existence? Are they not these?—

First.—They are there, permitted by former law and former authorities, and as such their owners have vested rights not to be lightly interfered with;

* The Association of House Factors and Property Agents in Glasgow.

Second.—They serve a certain class of the population which, on economic or social grounds, could not be equally served in front lands; and

Third.—If they were destroyed, there are no houses in the city or its suburbs of equal size and rents in which their inhabitants could reside.

Let us consider these positions one by one.

First.—They are there, permitted by former law and former authorities, and as such their owners have vested rights not to be lightly interfered with.

This argument is one which, in a special degree, has been recognised by Parliament in all Acts dealing with the closing and demolition of what are termed in the Housing of the Working Classes Act, 1890, "Obstructive Buildings." Of course, all "back lands" or buildings occupied as dwelling-houses, and situated behind another land or building facing the street, are not "obstructive buildings." Many "back lands" are quite sanitary, and have around them plenty of air-space for ventilation and access of light; plenty of ground space for ashpits and other conveniences. No argument is needed to support their continuance in all time coming as suitable dwellings. The argument is only required when (1) they are so placed that the back land "stops ventilation, or otherwise makes, or conduces to make, such other buildings (as the front land) to be in a condition unfit for human habitation, or dangerous or injurious to health;" or (2) "if they prevent proper measures from being carried into effect for remedying any nuisance injurious to health or other evils complained of in respect of such other buildings."

In the latter case the owner may say, "Well, I know nothing of the law, and little about the sanitary necessities of the case; all I know is that the building of this back land has been allowed by some constituted authority, that it was a rent-producing subject, and, in good faith, I invested money in it. Am I now to lose my investment because it does not conform to modern requirements?" The law says—"Yes; you must lose your investment if it can be proved against the

property that it is an 'obstructive building' in the sense of either of the above conditions." But, notice, one of these conditions must be established by proof, and if the Local Authority are satisfied by the proof set before them, and order the demolition of the obstructive building, the owner, by giving notice within one month, may appeal to the "Superior Court," which, by Section 93 of the 1890 Act, means the "Supreme Court," which means in Scotland the Court of Session. If the owner's argument fails to convince that Court that his property is not an "obstructive building," then it must be demolished.

At this stage of the proceedings a new set of conditions arise. The argument now carries the owner of the obstructive building into certain rights of compensation. His vested rights entitle him to claim—*first*, compensation for the site; *second*, compensation for the building, based on its "fair market value as a rent-producing subject." These are questions which, if not settled amicably between the Local Authority and the owner, become the subjects of protracted and expensive debate before an arbitrator appointed by the Local Government Board. In this arbitration there are three platforms for debate—*first*, whether the rents have been enhanced by overcrowding or other illegal use of the dwellings; *second*, whether the dwellings are insanitary in themselves, or not in reasonable repair; and *third*, whether the building or any part of it is unfit for human habitation, and is not able to be made so fit.

If none of these things can be proved against it, then full compensation on rental must be paid for it, no allowance being made for compulsory purchase.

If the first can be proved, then the arbitrator may reduce the basis upon which compensation has to be fixed, viz., the rentals. If the second can be made good against it, he can deduct from the value the estimated expense of putting the property into "reasonably good repair." If the third, then only the site and the value of the materials of the buildings, or part thereof, can be claimed by the owner.

You see, therefore, that the law hedges an owner round with good weapons of defence, provided the owner is a man or woman who can afford to pay for them. In any case, it always allows him to petition to the Local Government Board within two months after the order of the Board sanctioning any scheme of demolition, in which case confirmation of the order is stopped, and the case must go before Parliament itself for final confirmation.

I think these facts should stop complaints that the law applicable to the taking away of obstructive back lands leaves owners too much at the mercy of Local Authorities. It seems to me to be the other way about, and that a Local Authority must at every stage prove its case against an obstructive back building up to the very hilt, and, after it has done so, it must acquire a site which probably it can't use for its own purposes, unless, of course, the back building belongs to the same proprietor who owns the front one, in which case the proprietor retains the site, and gets compensation for his back land, in terms of Section 41 of the Housing of the Working Classes Act, 1890.

There are three sets of conditions which lay a "back land" open to attack under the 38th Section of the Housing of the Working Classes Act:—

(1) It stops ventilation;

(2) It *otherwise* makes, or conduces to make, some other building unfit for human habitation: or

(3) It prevents any nuisance injurious to health, or other evils complained of in respect of some other building, from being properly removed or remedied.

Now these terms are general in their character, and leave ample room for difference of opinion and debate. What is meant by "stopping ventilation"? When is a building unfit for human habitation? and under what circumstances can it, with good reason, be urged that contiguity absolutely prevents the removal of nuisance?

A representation against an obstructive building under any of the above three counts may be made to the Local Authority (*a*) by the Medical Officer of Health, or (*b*) by any four or more inhabitant householders in the district. This is all that is necessary to set the law in motion. But a long and tortuous path now lies in front of the parties if they cannot agree. This is due to the very general and hazy terms of the section. It becomes a fight between adverse opinions, and affords a splendid field for the exhibition of human controversy and the mental gymnastics of that invaluable creature known as "the expert witness."

Our legal friends and the "experts" are surely the only parties who can sincerely rejoice in the evident inability of Parliament to put down in statute law what it really means. "If it stops ventilation:" what does that mean? So far as human health is concerned, every house should be able, by the opening of its windows and doors, to be filled with fresh respirable air. Now, there is no house in any city which has a fireplace and doors and windows in relatively suitable positions which cannot be ventilated, and ventilated well, should a fire be burning in the grate. The ventilation of any house does not quite depend upon openness of situation. The word "ventilation" is quite a misnomer here. It ought to read—"If it stops, or tends to stop, a reasonably free circulation of air in and *around* such building." You will notice the one condition is quite different from the other. The perfect ventilation of mines and tunnels at once occurs to any one in this connection; but while these and other enclosed or submerged spaces can, by simple constructional devices and appliances, be adequately ventilated, they cannot have a "circulation of air" around them. Now, it is this circumambient space in which the air may have free play that is one of the important desiderata in connection with dwelling-houses—important, not because any individual house only eight or ten feet from its neighbour across the court cannot be quite well ventilated, but because the almost equally valuable and essential condition of free daylight is not available for its inhabitants.

The value of daylight as a sanitary agent is quite well understood and admitted, and yet the Act in this part is quite silent upon it, and emphasises "ventilation" of a building, which has no absolutely necessary connection with a too close proximity of one building to another. In its second part, it is true, the words "or otherwise makes or conduces to make such other building to be in a condition unfit for human habitation, or dangerous or injurious to health," are employed as an alternative condition; but I am strongly of opinion that if fairly good ventilation can be proved to be obtained for each house in a building, and no nuisance can be alleged to exist within or immediately without it, the question of want of sufficient light alone would not, under this part of the Act, be considered sufficient to condemn the building as an "obstructive building." The section in this part is therefore weak, and should be amended.

I think that you will agree that any building so near to another as to prevent access of a reasonable amount of daylight to the dwellings it contains, is not a building fit for human occupation, and must prove in the long run dangerous to the health of its inmates, especially to those who are very young.

Assuming this, let us consider the question—"What is a 'reasonable amount of daylight' for any dwelling-house?" The theoretical amount is, of course, that which gives a sight of the sky from every part of a house at its floor level directly opposite the window. This means that every part of the floor of any house in front of its window receives direct illumination from the sky. Diagram I. exhibits what this

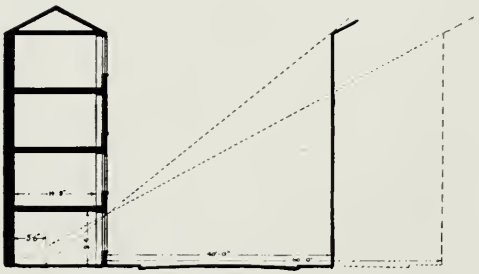

Diagram I.

means in practice. Here you have a four-storey building such as the Corporation erected for working people at 45 St. James' Road. The single apartment houses on the ground floor are 14 feet 9 inches in length from wall to wall inside. In order that the rays of light from the sky should impinge upon every part of the floor opposite the windows looking out on to the street, the block of buildings on the opposite side, 40 feet in height, should not be nearer than 60 feet. As matter of fact, the street is only 40 feet wide, so that 5 feet 6 inches of the floors of the ground flat dwellings get no direct skylight, and therefore do not come up to our theory.

Leaving theory, we have now to consider the legal standard. It is that in front of every window there shall be a free space of not less than three-fourths of the height of the wall of the building in which the window is situated. That is to say, that for a four-flatted building 40 feet in height to the eaves, the free space shall not be less than 30 feet.

Diagram II. shows you a 40-feet building on each side of a 30-feet street. From this it will be seen that on the floor

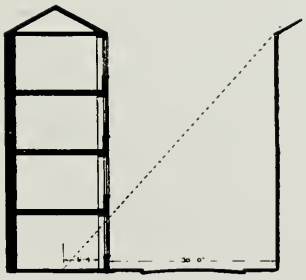

Diagram II.

level sight of the sky is lost 6 feet 4 inches from the window, and the remainder is left to be illuminated by diffused light.

This, then, is the standard of the Glasgow Police Act, 1866, and surely it is fair to assume that all dwellings which do not conform to this law, made 35 years ago, are not in this year, 1901, adequately lighted, and consequently should be

placed in the category of houses which are "obstructed" themselves, or are, in turn, portion of an "obstructive building" in relation to the building opposite to them. This principle has been recognised by Parliament in the 40th Section of the Glasgow Building Regulations Act, 1900, by which, in two years, all dwelling-houses so situated may be absolutely closed from human habitation.

Leaving theory and law, we may now for a moment consider the matter from a purely practical standpoint—that is, from the standpoint which you, as representing proprietors' interests, may be supposed to consider it. In what I am now about to say I assume you will not be willing to admit that direct skylight across the whole floor of a dwelling is necessary, nor that every house is too dark which is within the three-fourths free space already alluded to. I ask you, therefore, when is a dwelling-house too dark to be healthy or fit for human habitation? and, mark, the question must be answered in relation not to a fine summer day, but in relation to the ordinary winter day in our latitude. Is it not when an ordinary person on an ordinary winter day cannot see to read the type of, say, a newspaper with reasonable facility in every open part of the house? Many a back-land house I have gone into in the city where, in the inner side by the ingle-neuk, the eyes can neither see to read nor sew, and the inevitable oil lamp on a normal winter day has to be kept alight. There are many of such houses we would have closed long ago had we been convinced that the poor persons who inhabit them could find, within the city, sanitary dwellings at rents within their means. It is a test which may be applied by any one, and, so far as I am concerned, will be applied in every case, whatever be the distance between the walls of a front and back land. Where light cannot enter in sufficient amount to permit of a tenant fairly distinguishing even the dirt and dust in every open part of the apartment, the apartment should be closed, as filth in such places is encouraged, and the air-space surrounding it is certain to be inadequate.

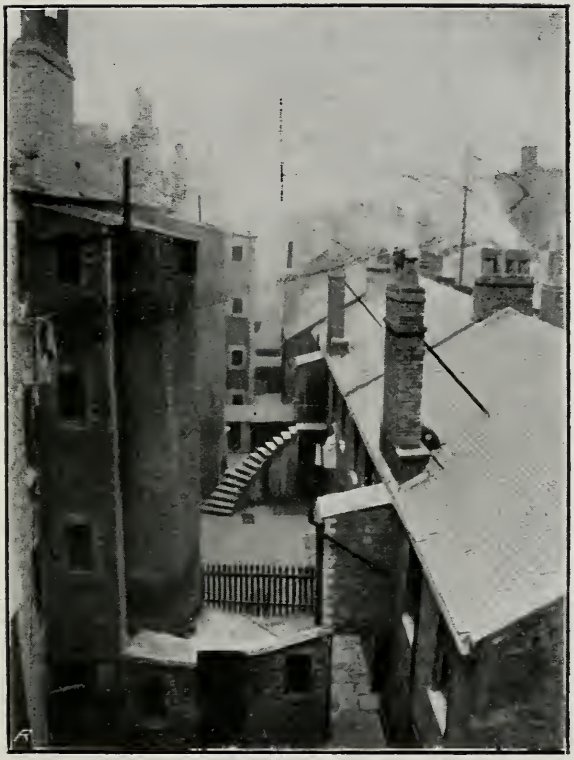

Photo. A.

This shows a range of two-storey back lands behind four-storey properties facing a front main street in the city.

The distance between them is about 21 feet. The ground-flat houses in these back lands are dark, and the ashpits are situated too close to the dwellings.

The second condition, which lays a building or house open to attack under the 1890 Act—viz., "it otherwise makes or conduces to make some other building unfit for human habitation"—points to the want of space upon which an ashpit may be sanitarily situated. The Glasgow Building Regulations Act, 1892, lays it down that every ashpit must be erected not less than 12 feet from the wall of any dwelling-house. This assumes that no court between buildings of any height could be permitted of less width than 30 feet, as an ashpit of reasonable dimensions must be 7 feet 6 inches broad over all. This is a reasonable provision, and serves to show how, in sanitation, one provision carries with it other hygienic necessities which are not mentioned or even indicated in the section itself. The old model bye-laws of the English Local Government Board put the minimum distance of an ashpit at 6 feet. It is difficult to see how any house could be sweet and healthy whose window was but a couple of yards from a pit into which all the tenants in a building were pouring their waste products, and out of which, weekly, these products were shot by the scavenger on to the court to temporarily pollute the whole of the immediately contiguous houses. But even assuming that such a minimum standard were adopted in judging as to whether any back land was too near a front land to allow of healthy conditions, the very shortest distance, taking this view alone, would be 20 feet; so that, on this basis, any back land less than 20 feet from the one in front of it would stand condemned.* I am meantime inclined to

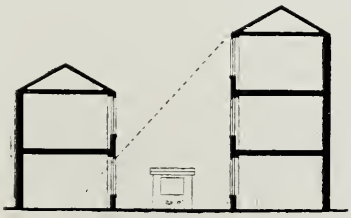

Diagram III.

* See Diagram No. III.

recommend the adoption of this low standard, and advocate the sweeping away of all back lands in the city which, being behind a building of more than two storeys in height, are not further removed therefrom than 20 feet, vested rights notwithstanding. Any greater contiguity must mean what is conveyed in Part 3 of the Act, viz., "that it prevents any nuisance injurious to health from being properly removed or remedied."

I shall now enter upon a consideration of the second argument, viz., "*They (back lands) serve a certain class of the population which, on economic or social grounds, could not be equally served in front lands.*"

This, of course, presupposes two things—(1) that the occupiers of the back lands are, as matter of fact, on a distinctly lower plane socially than their front-land neighbours; and (2) that the rents charged for the back-land houses are materially lower than those for similar houses in the lands or properties facing the street.

In order to discover certain facts which might help to differentiate as between the two classes of tenants, I requested the female inspectors, who are so intimately acquainted with them and their houses, to ascertain the following in one and two-apartment houses:—

TABLE I.—SHOWING PARTICULARS CONCERNING 5,508 ONE AND TWO-APARTMENT TICKETED HOUSES IN GLASGOW.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	Total Number of Houses.	Average Rent per Month.	Average Cubic Space.	Average Earnings of Head of House.	Average Tenancy of House.	Average Number of Family.	Members of Family Working.	Average Weekly Earnings of Family Working.	Average Weekly Earnings of each Household.	Respectable Tenants.	Nativity (Totals). English.	Irish.	Scotch.	Foreign.	Religion (Totals). R.C.	Protestant.	Jews.	None.	Church Attendants.
Front Lands—																			
1 Apartment,	682	9/9½	1,210·3	18/1½	3½ yrs.	3·2	10·8%	8/8	21/1	82·5%	14	249	417	2	286	395	—	1	82%
2 Apartments,	317	12/1	1,893	19/2	6 yrs.	4·3	22·4%	9/10	28/9	88·6%	6	133	177	1	160	157	—	—	86%
Back Lands—																			
1 Apartment,	2,638	8/4¼	1,298	16/1	3 yrs.	3	12·3%	9/3½	19/7	76%	75	970	1,584	9	1,236	1,383	1	18	59·8%
2 Apartments.	1,871	11/11½	1,978	18/5½	4 yrs. 4 mhs.	4·2	18·7%	12/3½	28/	83·3%	42	787	1,023	19	967	886	9	9	74·8%

For the purpose of this enquiry 5,508 separate houses were visited—999 in front properties and 4,509 in back properties.

Taking the front lands first, it will be observed that 682 one-apartment dwellings and 317 two-apartment dwellings were visited. The average rentals of the former were found to be 9s. 9½d. per month for 1,210 cubic feet. which payment is made from an average household weekly earning of 21s. 1d. The corresponding figures for the two-apartment houses in front lands are 12s. 1d. for 1,893 feet, from 28s. 9d. per week.

For practically similar accommodation in back lands we find that for the single apartments there the average monthly rent is 8s. 4¼d., out of a household wage amounting to 19s. 7d. per week; and for two-apartment houses there, 11s. 11½d. per month, out of 28s. per week.

From these figures it appears the front-land tenant of the one-apartment house pays 10·5 per cent. of the household earnings in rent, and the two-apartment tenant 9·75 per cent. of it. The back-land tenant of the single-apartment house pays 9·85 per cent. of the total earnings in rent, and the two-apartment tenant there pays 9·51 per cent.

The status of the one class as against the other is only differentiated by 1s. 6d. per week in the case of the one-apartment households, and by 9d. a week in the case of the two-apartment households, while the respective rents they pay differ in favour of the back-land tenant of one apartment by 1s. 5¼d. per month, and in favour of the back-land tenant of the two-apartment dwelling by the small sum of 1½d. per month. Therefore, in respect of rentals and earnings, there is little or nothing to choose between them. Of course, it may be urged that, by paying 1s. 5¼d. a month less for the same cubic space, the tenant of the one-apartment house in the back land has a material advantage over his front-land neighbour, but the same cannot be argued for the two-apartment tenants in the two classes, as no one can, with show of reason, state that 1½d. per month compensates the back-land tenant for the difference of his situation.

Let us now examine the table for any other fact which will clearly show that the two classes of tenants are materially different. Column 10 has reference to the respectability of the tenants, which has been gauged by the inspectors, who know them and their habits so intimately. After visiting such houses for years one comes to ascertain, with a fair amount of correctness, the right of a tenant and his family to be certified "respectable." There are unhideable symptoms which disclose this—the appearance of the tenant and family, their bearing, the state of the house, the character of the furnishings in the house, and the undefinable something which tells the intelligent visitor whether the tenant is or is not a thriftless and dissolute person. Even here the figures do not exhibit any marked divergence. It is true the difference is in favour of the front-land tenants by from 5 to 6 per cent., but it is not sufficient to suggest that, by reason of the want of respectability, the inhabitants of our back lands are there and ought to be kept there. Neither is it to be found in nativity, nor in religious persuasion. Only in the matter of church or chapel attendance is there anything like marked difference in favour of the tenants of the front lands, and, of course, in this matter the word of the tenants themselves is all we have to go upon.

On the whole, then, we are driven to the conclusion that, as between the two, there is no well-marked line which divides them, either socially or from the point of view of economics.

As already stated, the 1s. 5½d. per month more paid by the tenants of the one-apartment houses in front lands is the most striking feature, but against that I have already shown in my lecture on "The Housing of the Labouring Classes" (1899), that the Corporation are now housing such tenants in front properties at 9s. 7d. per month for the use of 1,844 cubic feet, in place of 8s. 4¼d. per month for 1,298 cubic feet in the back lands. Did the Corporation front-land single apartments contain only 1,298 cubic feet of air space, instead of 1,844 cubic feet, the rental would proportionately be about 6s. 9d. per month, in place of 8s. 4¼d.

Upon this second ground, therefore, I am bound to say there is no argument whatever for the necessity of a continuance of back lands in our city.

Let us now examine the third argument, viz., that "*If the back lands were destroyed, there are no houses in the city of equal size and rents in which their inhabitants could reside.*"

This indeed is, in the words of Dryden, "a knockdown argument." Where are our backlanders to go when their present dismal blocks are demolished? We cannot do without them. Out of the 2,639 back-land families in single apartments which were visited for this enquiry, no less than 1,069 were those of unskilled labourers, or 40 per cent. of the whole. Of the 1,872 tenants of the two-apartment dwellings in back lands, 885 were unskilled labourers, or 47 per cent. These, our "hewers of wood and our drawers of water," have, like Childe Harold, only too good cause in many cases to cry—"Oh! that the desert were my dwelling-place." But in cities they must live, both for their own sakes and for the sake of our welfare in this great industrial community.

Glance over the Table No. II., which shows the callings of all the tenants that were called upon. Here we have as "backlanders," bakers, blacksmiths, butchers, cabmen, carters, dairy workers, domestic servants, engineers, firemen, hammermen, hawkers, joiners, lamplighters, laundresses, masons, pickle workers, plasterers, plumbers, postmen, printers, salesmen, scavengers, seamen, seamstresses, shoemakers, skilled labourers, slaters, tailors, toy makers, umbrella coverers, waiters, and others too numerous to mention, whose labour has the most intimate connection with the city's well-being as a whole, and whose services may be requisitioned by any one of our citizens from the highest to the lowest. I often wonder if the better classes in our city adequately realise the possible, nay, the probable, intimate connection, all unsuspected often, of the "backlander" baker, butcher, tailor, seamstress, waiter, with their own lives and social circle. I fear they too often listen irresolute, like Macbeth to

Photo. B.

This is a view of a back land, looking east.

It is about 21 feet from the four-storey land in front of it. In the ground-floor houses, in broad day, I could not read a newspaper article standing at the back of the apartment in front of the window, and the tenant said she could not sew except by the aid of a lamp.

TABLE II.—SHOWING OCCUPATION OF THE TENANTS OF 5,508 ONE AND TWO-APARTMENT TICKETED HOUSES IN GLASGOW.

Occupation.	Front Lands.		Back Lands.		Occupation.	Front Lands.		Back Lands.	
	One Apt.	Two Apts.	One Apt.	Two Apts.		One Apt.	Two Apts.	One Apts.	Two Apt.
Actor, - -	...	..	...	1	*Brot. forward*,	28	17	105	74
Bagsewer, - -	1	..	3	...	Car Conductor,	..	..	2	2
Baker, - -	6	3	23	6	Car Driver, -	...	...	1	1
Barber, - -	2	1	4	4	Carpet Weaver,	...	...	...	1
Basketmaker, -	...	...	1	...	Carter, - -	38	12	117	82
Beltmaker, - -	...	...	...	1	Cartwright, -	...	...	2	2
Bill Deliverer, -	...	...	1	...	Charwoman, -	34	11	226	70
Billposter, - -	...	...	1	3	Cigarette Maker,	...	1	1	...
Blacksmith, -	1	2	24	12	Clerk, - -	2	1	...	3
Boilermaker, -	9	5	8	8	Clothlapper, -	...	...	2	...
Boltmaker, - -	...	...	2	...	Coachbuilder, -	1	...	..	...
Bookbinder, -	...	1	4	1	Coalman, -	1	1	2	2
Bottle Labeller, -	...	1	...	...	Coal Merchant,	...	...	...	1
Boxmaker, - -	1	...	6	5	Confectioner, -	...	...	1	...
Brassfinisher, -	2	2	8	6	Cooper, - -	1	1	9	5
Bricklayer, - -	1	...	5	8	Coppersmith, -	2	...	3	1
Brickmaker, -	...	...	2	1	Dairy Worker,	...	...	2	...
Brushmaker, -	1	...	1	2	Domestic, -	21	16	139	92
Butcher, - -	...	...	1	1	Dressmaker, -	2	...	...	...
Cabinetmaker, -	3	...	4	6	Driller, - -	1	...	2	1
Cabman, - -	...	1	5	7	Drover, - -	...	..	...	1
Calenderer, -	1	1	...	...	Dyer, - -	...	...	2	3
Canal Boatman, -	...	...	2	1	Dyker, - -	...	...	3	1
Canvasser, - -	...	...	...	1	Electrician, -	1	...	...	...
Carry forward,	28	17	105	74	*Carry forward*,	132	60	619	342

Occupation.	Front Lands.		Back Lands.	
	One Apt.	Two Apts.	One Apt.	Two Apts.
Brot. forward,	132	60	619	342
Enameller, -	...	...	1	...
Engineer, - -	7	5	16	12
Engineman, -	1	...	2	5
Farm Worker, -	...	...	3	...
Fireman, - -	32	10	16	23
Fishcurer, - -	...	...	6	...
Fish-hook Maker,	...	...	...	1
Fitter, - -	1	...	3	6
Gardener, - -	2	...	4	...
Gilder, - -	...	...	2	1
Glassblower, -	...	...	...	1
Glazier, - -	...	...	3	1
Gravedigger, -	...	...	...	1
Grinder, - -	...	...	1	1
Grocer, - -	...	...	1	...
Hammerman, -	10	3	16	20
Hawker, - -	4	5	70	45
Holder-on, - -	...	2	...	...
Insurance Agent,	...	...	1	...
Interpreter, - -	...	1	...	...
Ironturner, - -	...	1	2	...
Ironworker, -	1	1	8	9
Joiner, - -	3	1	24	17
Labourer, - -	303	132	1,069	885
Carry forward,	496	221	1,867	1,370

Occupation.	Front Lands.		Back Lands.	
	One Apt.	Two Apts.	One Apt.	Two Apts.
Brot. forward,	496	221	1,867	1,370
Lamplighter, -	1	3	10	8
Lather, - -	1	...	3	3
Laundress, -	...	1	5	5
Lodging-house Keeper, -	4	3	7	14
Machinist, -	5	...	22	5
Marble Worker,	...	...	...	2
Mason, - -	1	...	25	14
Mattress Maker,	...	...	...	1
Miller, - -	1	...	...	1
Millworker, -	2	...	27	5
Millwright, -	...	...	...	1
Miner, - -	4	...	52	24
Moulder, - -	8	4	38	44
Nailmaker, -	1	...	...	...
No occupation,	30	22	199	95
Nurse, - -	...	...	1	...
Packer, - -	...	...	1	1
Painter, - -	4	2	19	15
Paper Cutter, -	1	...	1	...
Paper Maker, -	...	...	3	2
Patternmaker, -	...	...	1	1
Photographer, -	...	...	2	...
Pickle Worker,	...	...	3	1
Pipemaker, -	...	1	3	3
Carry forward,	559	257	2,289	1,615

Occupation.	Front Lands.		Back Lands.	
	One Apt.	Two Apts.	One Apt.	Two Apts.
Brot. forward,	559	257	2,289	1,615
Plasterer, - -	2	...	3	3
Plater, - -	1	...	...	...
Platelayer, -	...	...	...	1
Plumber, - -	...	1	2	2
Pointsman, -	...	1	...	1
Polisher, - -	...	1	1	1
Porter, - -	1	2	9	5
Postman, - -	...	...	1	1
Pottery Worker, -	...	2	5	2
Poulterer, - -	...	...	...	1
Printer, - -	1	...	9	5
Quarryman, -	...	...	1	...
Rag-store Worker, -	...	...	3	7
Ratcatcher, -	...	...	1	1
Rigger, - -	4	1	2	4
Rivetter, - -	6	6	9	8
Saddler, - -	...	...	2	...
Sailmaker, - -	1	...	...	...
Salesman, - -	1	1	11	5
Sawyer, - -	...	1	3	1
Scavenger, - -	...	...	4	3
Seaman, - -	2	...	17	10
Seamstress, -	11	4	16	10
Shawl Fringer, -	1	...	1	...
Carry forward,	590	277	2,389	1,686

Occupation.	Front Lands.		Back Lands.	
	One Apt.	Two Apts.	One Apt.	Two Apts.
Brot. forward,	590	277	2,389	1,686
Ship Carpenter,	1	1	1	...
Shirt Finisher,	1	...	1	...
Shoemaker, -	7	3	40	43
Showman, -	...	3	4	3
Skilled Labourer, -	40	17	105	64
Skindresser, -	...	...	2	1
Slater, - -	1	1	7	10
Soldier, - -	10	2	2	1
Soldier's Wife,	...	...	1	...
Spindlemaker, -	...	1	...	...
Stableman, -	1	...	2	2
Stair Railer, -	...	...	...	1
Steeplejack, -	...	...	...	1
Stickbreaker, -	1	...	8	...
Steward, - -	...	1	...	1
Stonebreaker, -	...	...	1	1
Street Musician,	...	...	2	...
Surfaceman, -	...	...	2	3
Sweep, - -	...	1	1	...
Tailor, - -	9	3	16	27
Tailoress, -	1	...	...	...
Tallowmelter, -	...	...	1	...
Tilelayer, -	...	...	1	...
Tinsmith, -	3	3	8	2
Carry forward,	665	313	2,594	1,846

Occupation.	Front Lands.		Back Lands.		Occupation.	Front Lands.		Back Lands.	
	One Apt.	Two Apts.	One Apt.	Two Apts.		One Apt.	Two Apts.	One Apt.	Two Apts.
Brot. forward,	665	313	2,594	1,846	*Brot. forward,*	667	313	2,607	1,854
Toolmaker, -	...	...	1	...	Venetian Blind Maker, -	...	...	1	...
Toymaker, - -	...	...	4	...	Waiter, - -	1	...	3	...
Transferer, - -	...	...	1	...	Warehouseman,	...	...	3	2
Traveller, - -	...	...	...	2	Watchman, -	6	3	6	7
Trimmer, - -	1	...	...	1	Weaver, - -	7	1	13	7
Twister, - -	...	...	2	1	Window Cleaner, -	...	...	1	1
Umbrella Coverer, - -	1	...	4	2	Wireworker, -	...	...	3	...
Upholsterer, -	...	...	1	2	Woodturner, -	1	...	1	...
Carry forward,	667	313	2,607	1,854	Total, -	682	317	2,638	1,871

the apparition of the bloody child, and croon to themselves—"Then live, back lands; what need I fear of thee?" In quiet and normal times, when pestilence is only heard of as stalking in distant lands, the public conscience is too apt to be soothed into this frame of mind. The apparition then seems to bid all "laugh to scorn the power of" slums! But in times like the present (1901), the apparition speaks in trumpet tones, "Beware! St. Mungo!" and then, like the changeful Macbeth, our better-class citizens bethink themselves like him, and cry out against slumland—

> "But yet we'll make assurance double sure,
> And take a bond of fate: thou shalt not live."

This is always the sanitarian's mental attitude towards the class of back lands I have been referring to—"Thou shalt not live." Yet they do live, and live to hurt and destroy.

But the argument against the "death" of back lands is contained in the sad fact that there are no cheap sanitary houses to be had in front lands nor other lands within

Photo. C.

This is a view, looking south, of a back land near the river. It is taken above the level of the eaves of the back property, and exhibits clearly how it has been built upon the area which naturally should be the back court of the property in front of it.

PHOTO. D.

This is the complement of Photo. C, looking north.

The back land is well shown on the right hand side. The death-rate of this area is one of the highest in the city, being 31 per 1,000 per annum.

Glasgow. If I put the houses vacant in the whole city under £6 of rental at 600 in all, I feel certain I overstate the supply.

Here, then, we have in a nutshell the slum landlord's best argument for being left alone. He is a public benefactor until the public build for the labouring classes, because he is keeping a roof over the heads of those who, apart from his back blocks, would have "no place wherein to lay their heads."

In this city it is not hundreds of good, substantial, cheap labourers' dwellings that we urgently need, but thousands of them, and until we have thousands of them, built by a powerful body or by the Corporation, and placed under caretakers, our city won't be right.

I have said that the slum landlord is, as things remain at present, a public benefactor. But this he is only in a negative way, and because he can't help it. His public benefaction runs parallel with his private interest. Unless he is compelled, he won't, as a rule, keep his property in thorough repair: he won't give his tenants water-closet accommodation or sinks and water supply in each house, except under official orders; and official orders in many cases are not forthcoming, because it is considered the said "orders" might bolster up his property against future attack. The landlord or factor who continues waiting for official orders, and consequently does nothing to put his back land into a good sanitary state so far as it can be put, apart from its "obstructive" situation, does not understand the meaning of the Act of Parliament I have alluded to in the first part of my lecture. But he ought to understand the meaning of the unwholesome and insanitary conditions under which his tenants have to live. I do not think it is necessary for me to go into nauseating details in order to exemplify, within the homes of the poor, the practical import of the want of "suitable and convenient water-closet accommodation," or the want of sink and water supply for each family. Each can imagine for himself what would happen in his house at times if these all-important adjuncts

to a clean family life were absent or difficult of access. You all may see the results I refer to by visiting the homes of the poor *at night*, or, if you cannot see it, *you can smell it.*

Before passing on to a consideration as to the houses which must replace insanitary back lands in Glasgow, I desire to say a word upon the state of many of the courts behind the humble tenements, and the dangers which arise therefrom. Too many of these are not only badly paved, but are not paved at all, the surface being of earth, or, at best, covered with ashes. Now, this is a condition of matters which, in the interests of cleansing and of public health, should not continue, whether there is a back land or no back land. An impervious surface is desirable behind such dwellings in a city under any circumstances, but it becomes absolutely necessary under our present ashpit system. Once or twice a week the foul contents are pitched out on to the surface, and in wet weather much of the organic matter is washed into the ashes or earth surface. It is impossible to doubt that myriads of disease germs of all kinds form a part of such material. Perhaps one of the most important is the bacillus of enteric fever; at any rate, we can take this disease as an example of what occurs in connection with others, such as tuberculosis and diarrhœa, two of our most deadly enemies. When enteric fever invades such a tenement, the infected parties probably go about for some time with the disease upon them before it becomes recognised. The dejecta are, of course, where water-closets don't exist, thrown into the ashpit, and from the ashpit, in due time, are cast out on to the pervious surface of the court. The most expert scavenger cannot pick up again all he throws down, and consequently the air becomes the carrier of the typhoid virus. Cases of infection from this disease have occurred from time to time, which cannot be traced in Glasgow to water or to milk, and, although the path of infection is in the great majority of cases through the digestive tract, it is recognised by the highest authorities that the lungs may occasionally represent the seat of invasion. But even assuming that the invasion

by the respiratory organs is rare, there still remains the contamination of the food, which in such dwellings is seldom far removed from the infected court surfaces. You will see, therefore, how important it is that all such courts should be asphalted or concreted, so that all offensiveness that may be left by the scavenger is, after his operation, immediately "hosed" off the surface into the drains. There is no doubt that sunlight and air destroy the typhoid bacilli as well as almost all others, but there remain the "resting spores" of the disease, which remain in a quiescent condition for a long time, and only await an opportunity to gain access to a body capable of being affected, and there develop into bacilli and begin anew their cycle of existence. We cannot await the advent of our new sanitary dwellings for the poor before reforming our back courts. It ought to be done now, and until it is done our poorer quarters will not be free from the probable invasion of disease, the rise and progress of which appear to the ordinary mind so mysterious.

And now as to the course of the future. The grimy inhabitants—the labourers, seamstresses, tailors, butchers, and bakers—who crowd in our back lands, what is to be done for them or with them? They cannot be turned out on to the streets! Insurrection lies that way, and the butchery and devil's work which comes of contact with the military. No! they must remain in their absolutely cheerless abodes until the day of their salvation comes. Some of us seem to think they ought to be able to work out their own salvation, and that dingy, airless, viewless surroundings should in no way prevent inner sweetness and scrupulous cleanliness. This myth is accepted as a truth by many well-meaning persons, who affect to see in the universal and strict, and even harsh, application of police law a remedy for the uncleanness of slumland. Gentlemen, I cannot accept the myth, because I am satisfied by long experience that it is a myth—false to the core. You do not look for grapes in a land where there is no sunshine, so you cannot look for cleanliness where there is defective light. Darkness and dirt are as mother and daughter in the dingy

back land, and no police regulations that were ever made, or soever put into execution, will bring sweetness out of, or put sweetness into, slums. Therefore, the cry of 50 per cent. of our poor, who, I believe, wish to be clean, goes up in what Carlyle calls "the huge inarticulate question—What do you mean to do with us?" Britain is ringing now with the question put in articulate form in the House of Lords but a short time ago, and the Government, through the voice of Lord Salisbury, answered—We cannot tell meantime, we are trying to grapple with the sphinx-riddle. And so, without State guidance or State aid, Local Authorities have to struggle on with the unsatisfactory Act of 1890 chained to their feet—struggle on through congestion, dirt, and epidemic disease, spending huge sums of money in the work of cure, which would have been much better spent in prevention.

It is difficult, without making an actual survey, to say what is immediately required in this city in the way of sanitary houses for the decent poor. I am quite safe, however, in stating that not less than 2,000 one and two-apartment houses should be erected with as little delay as possible upon light and airy situations and convenient to the city. These should be erected in blocks, on somewhat similar lines to those recently built by the Corporation at Haghill, where £14,425 was spent in providing 153 labourers' dwellings. This would involve a cost of £180,000 for building, and would accommodate, at our present standard of occupancy (400 cubic feet per adult), 12,974 persons over ten years of age. It would necessitate the purchase of 42,240 square yards or thereby of land, which, taking the average cost at 10s. per yard, would cause the expenditure of £21,120 more.

The total sum, therefore, in land at 10s. per yard, and the necessary buildings of four storeys in height, with ample yard space behind, would come out at about £201,120.

Were such a scheme put in hands and completed, say, within the next five years, a beginning could be made in earnest with the condemnation and destruction of insanitary back blocks, which at the present time is quite impracticable.

In no other way dare we attempt to relieve the present congestion. Glasgow will not, I trust, fall into the mistake of London, particularly in her Boundary Street Area Scheme, whereby 5,719 persons were to be displaced—2,000 immediately, and before any new accommodation was provided for them. The result was the scattering of this great number of low-class tenants to find such accommodation as they best could in the surrounding neighbourhood, and, as I am informed, in the overcrowding of the district.

This putting of the cart before the horse is always to be deprecated. It is easy to range within a half-mile radius of a scheme in any city, count the number of vacant houses within that circular mile, and state, "Yes, there are so and so vacant houses; go on with the demolition." That is not the question. If there be not a sufficiency of houses of the size and the rental demanded by those to be displaced within a reasonable distance, then the demolition should not be sanctioned until there is, or until, by the erection of new buildings, a sufficient number of suitable dwellings have been erected.

There are other lessons to be learned of the gravest importance from a survey of working-class buildings in the English Metropolis, where, I regret to say, land seems to be so expensive as to have caused back lands to be *recently built*, which cannot be considered to contain, in the lower flats, healthy dwellings for the people. One immense block I visited, containing five storeys and attics, stands only 36 feet behind a similar structure facing the street. In Glasgow I trust such a thing could not happen, notwithstanding the relaxation which is permissible under the Building Regulations Act in the case of blocks of dwellings for the working classes.

The houses in such blocks should be of a fair size. The cramping down of rooms, as we find can evidently be accomplished in London, to 13 feet by 11 feet by 8 feet 6 inches for the kitchen, and 13 feet by 8 feet by 8 feet 6 inches for the bedroom, or a total of 2,099 cubic feet in two-apartment

houses, should by no means be encouraged. I find that there such houses are let by the County Council at 5s. per week, or £13 per annum; whereas, in Glasgow, our Corporation give a two-apartment house of 3,500 cubic feet for £10 per annum, or 3s. 10d. per week.

Of course, we all must admit, I think, that the much maligned one-apartment house is, in all large cities, an absolute necessity, but it should contain not less than 1,600 cubic feet of free air-space, and should not be rented at more than is charged by our Improvement Trust for 1,800 cubic feet, viz., 2s. 2½d. per week, or £5 14s. 10d. per annum (water and stair gas included), which comes in at about one-tenth of the unskilled labourer's wage.

Compare this with the "Culham" single-apartment dwellings of the London County Council on the Boundary Street Area, with an air-space of about 1,324 cubic feet, and a rental of 3s. 6d. per week, or £9 2s. yearly. Unskilled labourers in London at these charges, and adopting our basis of his rent being at a tenth of his wage, would require to earn 35s. weekly. I do not know what he earns there, but I am certain it does not amount to the sum named, so that either he is not to be found at all in the Council's single apartments on that area, or he is paying more nearly one-sixth than one-tenth of his earnings in rent for his small apartment.

That is, I contend, not as it should be. So long as Glasgow can house her labourers, as she has shown she can do, in a roomy and sanitary house at or near a tenth of their average income, and leave a small surplus for sinking fund and reserve, she shall require no aid from the imperial exchequer, and, that being so, she shall not only feel independent of such aid, but will be in a position to oppose the appropriation of State funds to such a purpose in London or other populous centres, where either the land or other commodities are so inflated in value as to render there a solution of the housing problem insoluble without recourse to country situation and cheap workmen's trains.

Now, before closing my remarks, permit me to say a few

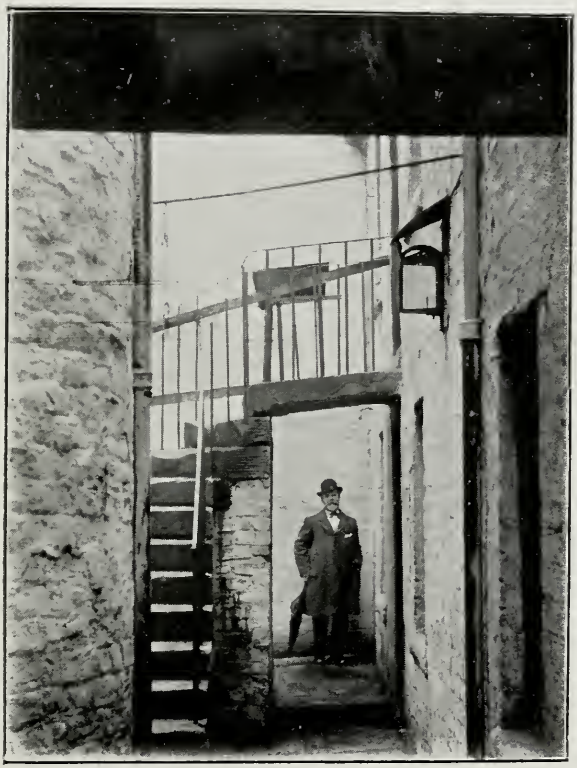

PHOTO. E.

The Inspector is shown here standing at the end of a narrow court between the back land and a second back land in the Cowcaddens district.

This is one of the worst samples of congestion in modern Glasgow.

words upon the important question of housing the poorer classes in country districts. The ostensible reason for this is, of course, to escape from the payment of dear land, and the consequent burden which dear land puts upon the rents payable by the poor. My experience among the poor drives me to the conclusion that they do not wish to be housed in the country, but in the city, near their work, and near the bustle and excitement of life. I feel bound to state this, however much I may sympathise with the common idea that the segregation of the poor is in their own interest and in the interest of the whole community.

By building a good, substantial, four-storey block of workmen's dwellings upon ground costing 30s. per square yard, demanding the payment of 3 per cent. on the capital expended; or upon ground costing 15s. per square yard, and demanding the payment of 6 per cent. on the capital expended, I find that the labourer does not pay more than 6d. per week for a two-apartment house containing 2,000 cubic feet, and 9d. per week for one containing 3,000 cubic feet. Now, what would he have to pay per week for railway carriage to and from his daily work? I find that under the Railways Acts of 1899 the South-Eastern and London, Chatham, and Dover Railway, and the Charing Cross, Euston, and Hampstead Line, charge 2d. for the return journey not exceeding four miles out and four miles back. This is admittedly very cheap travelling; yet, cheap as it is, it costs one individual 1s. per week, to say nothing of the travelling requirements of any others of the family. It is a common condition in a labourer's family that, at the least, one more of the family is working. Where this happens, 2s. per week would be required to meet travelling expenses, or a sum which would enable the labourer to sit upon city ground near his labour, in a house of 3,000 cubic feet, costing *£3 per square yard*, and still leave him 6d. per week in pocket, and this, be it remembered, on the assumption that he shall pay *nothing* for his ground in the country.

The land question, therefore, up to £3 per square yard,

means nothing to the labouring man with a family, from an economic point of view, unless the State or the Municipality pays for his train. Then, and then only, will the poor, who are at present housed in the city, find it to be to their interest financially to sacrifice their longings for city residence and reside in suburban areas. Every shilling in their case has to be carefully counted, and until you can show them that it will be cheaper to go out, they will, I believe, remain in.

Whatever be the final outcome of the earnest consideration which the Government has promised to give to this grave and great question, it is difficult to conceive there will be any juggling with either the facts or the figures. It will not avail. Land to be redeemed from labourers' rents, and buildings built to be stable and sanitary for 100 years, to be redeemed in 40 or 50 years, will not do. These provisions may be considered satisfactory from the capitalists' point of view, or from the view of the Treasury, but we may rest assured the growing sense and intelligence of the nation on the "housing" problem will condemn the imposition of any burden on the poor which is not perfectly reasonable, and which tends rather to protect capital than to protect the struggling among our population in their securing a sanitary dwelling at the lowest possible cost consistent with economic safety.

I fear there is too much stress in these days laid upon the question as to how to secure that the housing of the poor may be made *to pay* the undertakers. Those who enter upon the solution of this problem with "making it pay" in their minds had better leave it alone. The poor cannot make it pay. They can only clear their feet, and return a bare 3 per cent. interest in money; but, under adequate conditions and proper care, they can pay in a higher and nobler sense, by becoming a sound, healthy, and happy integral part of an empire upon which the sun never sets.

DIAGRAM SHOWING THE GROSS RENT A LABOURER OR POOR PERSON PAYS WEEKLY FOR EACH 1000 CUBIC FEET IN HIS DWELLING IN 9 DIFFERENT BLOCKS OF TENEMENTS IN THE CITY, AND ALSO HOW MUCH OF THIS RENT IS EXPENDED: (1) FOR GROUND RENT, TAKEN IN EACH CASE AT 30/- PER SQUARE YARD & CAPITALIZED AT 3%. (2) FOR INTEREST ON THE VALUE OF THE BUILDING AT 2½%. (3) FOR MANAGEMENT, OWNERS TAXES, & INSURANCE. (4) FOR ACTUAL REPAIRS ON THE PROPERTY. AND (5) SURPLUS INTEREST OVER 2½% ON VALUE OF THE BUILDINGS.

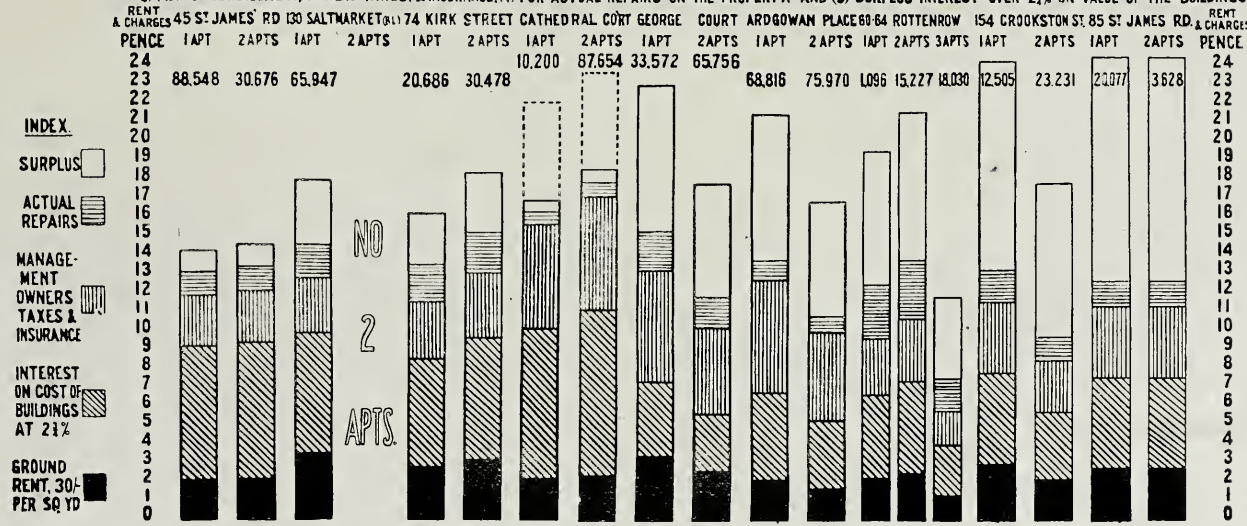

Photo. F.

A corner in High Street. This property was recently acquired by the Improvement Trust, and will shortly be demolished.

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What the People Sleep Upon.

It has been said that "there are combinations of evil, against which no human energies can make a stand." Combinations of evil, at all events in a sanitary sense, seem peculiarly attachable to a certain class of the people. It is this class I had in my mind when I put down the word "people" in the title of the present paper. The major part of the people in this city are composed of those who nightly sleep in houses of one or two apartments. The most of them dwell in this limited space because they cannot afford to pay for more. Poverty compels them. The combinations of evil which dog the heels of poverty anywhere, but especially in the welter of city life, are only really known by those who day by day go down among it; and even *they* would need a microscopic eye to see the causes of the evils there. We see diseases the origin of which we cannot trace; they spring up here and there in apparently unconnected series, and, science baffled, labels them sporadic. They linger persistently in the poorer quarters of the town, and the prescription of preventive medicine—cleanse the house, flush the drains, hose-wash the courts, limewash the ashpits, and all the other hygienic formulæ—appear to fail as a panacea for them. Enteric, dysentery, diarrhœa—autumn after autumn seem as busy as ever among the people. To me it has always appeared unaccountable that, with a wet climate, an irreproachable water supply, daily supplies of uncontaminated milk, a closely guarded meat and food supply, a reasonably perfect sewage system, and gigantic cleansing operations continually proceeding—we should still witness the sufferings of the people from obviously preventable diseases such as I have named, and others I have not named. It may be

that every weapon which bacteriology and chemistry can arm us with will fail to bring our elusive enemies within striking distance, but it appears to me one of the duties of sanitary inspectors to be also sanitary "suspectors," and leave no covert unsearched and unbeaten in which these enemies may be lurking.

It was in such a frame of mind I happened to be, when, in the company of friends fully a year ago, one of them, who was in the bed-making trade, began to speak of some new pine-fibre material he was introducing to this country, which would be cheaper and healthier than hair to sleep upon. The conversation soon turned upon the whole question of bedding material, and this expert's opinion was that much of the material of which beds were made, and particularly wool-flock, with which also chairs, sofas, and cushions were stuffed, was of a most objectionable kind. I determined, when time would permit, and upon a suitable occasion, to make some investigation into the subject. This Congress of The Sanitary Institute seemed to offer the chance of a wider publicity for its consideration than any local meeting could; so, in view of to-day, I proceeded to collect some special information on what the poorer of our people sleep upon. I called to my aid some makers of common wool-flock, wholesale vendors of this material, some of the sanitary staff (male and female), and, finally, the Corporation Chemist, Mr. Harris, and the City Bacteriologist, Dr. Buchanan; and to all I have been much indebted for their hearty co-operation. Let me now present you with a brief statement of the proceedings which were taken, and the facts which have been brought to light.

I think you will agree with me that the existing state of affairs is most deplorable, and that this conference of sanitary inspectors from the four corners of the United Kingdom and Ireland would be wanting in appreciation of the magnitude of the evil, if it did not unanimously call upon the Council of the Institute to earnestly press upon the Government, the need for immediate reform.

The first proceeding was to discover the truth with regard to the exact nature of this wool-flock. I accordingly visited the works of several makers of it in this city. There, in the middle of February, I witnessed in each place a conglomeration of filthy rags — the offcast of every class of the population, from the wealthy of the West-end to the tramp and vagrant of the East. I examined certain individual parts of material, which was to be made by the "Devil" into bedding for the people. (I may explain that this is the appropriate name given to the machine which performs the laniary process.)

To explain to you, in Parliamentary language, what I observed on some of the torn garments would be impossible. It is better left to the imagination. Only those pieces, soaking wet or too damp for the "Devil" to tear into shreds, were cast aside to be stoved, either beside the steam boiler or in a special drying chamber heated by steam. Nothing in the nature of cleansing or disinfection is attempted. All goes into the machine if sufficiently dry. At the other end it comes out as "flock," shredded so finely by the spikes or teeth on the periphery of the drums as to appear as fluffy wool of a dark grey, black, or brown hue, depending on the colour of the rags passing through the machine.

I show you here, in a glazed wooden case, the various kinds of flock used as bedding, 12 in number, and the wholesale prices of each class. I will refer to the contents of the case later on.

The great mass of dust and finely-powdered filth which is set free by the "Devil" is blown by a fan attached to it, into a dust chamber, out of which much of it finds its way into the surrounding atmosphere.

From one of the factories I secured in February last fully a pound of the flock as it came from the machine. At the sanitary office I weighed off half-a-pound. The Corporation Chemist gave me two Winchester jars of cold distilled water, in which I twice rinsed this quantity.

The first rinsing was in 2·09 litres, or ·45 of a gallon, for ten minutes; and the second rinsing in the distilled water of the second jar, containing 2·5 litres, or ·55 of a gallon, for an equal time. These two samples of defiled water were then handed to the Corporation Chemist for analysis. His report to me is contained in the table, page 5.

In order that you may be able to grasp the extent of the filthiness of this bedding, the chemist, at my request, has placed underneath, on the third row, his corresponding analysis of average Glasgow crude sewage for the quarter ending 29th February. Under every heading the bedding shows very badly, as compared with the sewage. Expressed in grains per gallon, the sewage contained ·816 of free and saline ammonia, against 1·924 grains in the rinsings from half-a-pound of the flock. Of albuminoid ammonia, against ·236 for the sewage, we have 2·002 for the flock. The oxygen absorbed in four hours at 27° Centigrade by the sewage was 3·811 grains, against 13·840 grains for the bedding. Of chlorine, 12·6 for the sewage, against 22·4 for the bedding.

Now look at the total suspended solids in the crude sewage, as compared with that found in the two rinsings of this half-pound of flock. For the average sewage we note it is 24·4 grains per gallon, while in the bedding rinsings it reached the alarming figure of 227·07 grains per gallon. You will observe that, even the second ten minutes' rinsing of the flock contained almost three times more suspended solids than had been found in the sewage.

I will not weary you with further comparisons (the tables tell their own dreadful story), but I finally direct your attention to the last column, in which you will see that the suspended solids rinsed during twenty minutes from the flock formed 3·12 per cent. of the whole.

In case it might be urged in criticism that the material I secured at this flock-making factory might have been of a specially filthy character, I caused a new flock bed, bolster, and two pillows to be purchased on the 10th of May from one of our largest city house furnishers. I

TABLE I.

1-lb. of Wool Flock (made from rags) was obtained immediately after passing through the Flockmaking Machine in one of our East-end Manufactories. ½-lb. of this Flock was twice rinsed in 2·25 litres or thereby (= ·5 of a gallon) of Distilled Water for a period of 10 minutes. The dirty water from both rinsings was put into two Winchester Jars and sent to Mr. Harris, the Corporation Chemist, for Analysis, on 25th February, 1904.

CHEMICAL ANALYSES OF RINSINGS FROM ½-LB. OF WOOL FLOCK (Expressed in Grains per Gallon).

	Free and Saline Ammonia.	Albuminoid Ammonia.	Oxygen absorbed in 4 hours at 27° C.	Oxygen absorbed in 15 minutes at 27° C.	Chlorine.	Solids in Solution.			Colour of Solution. (Loch Katrine Water =10).
						Mineral.	Volatile.	Total.	
1st Rinsing, ...	1·336	1·330	9·560	5·104	18·2	66·92	57·54	124·46	454
2nd Rinsing, ...	0·588	0·672	4·280	2·793	4·2	19·04	21·00	40·04	333
						Suspended Solids contained in Crude Sewage.			
Quarterly Average Composition of Sewage for Quarter ending 29th February, 1904, ...	0·816	0·236	3·811	...	12·6	10·56	13·84	24·40	...

AMOUNT AND NATURE OF SUSPENDED SOLIDS.

	Amount of Suspended Solids in grains per gallon.		Actual Weight of Suspended Solids in ½-lb. of Flock.		Weight of Suspended Solids in percentage of Weight of Flock rinsed.		Actual Weight of Total Suspended Matter extracted.	Weight of Suspended Solids in percentage of Weight of Flock rinsed.
	1st Rinsing.	2nd Rinsing.	1st Rinsing.	2nd Rinsing.	1st Rinsing.	2nd Rinsing.		
	Grains.	Grains.	Grains	Grains.	Per cent.	Per cent.	Grains.	Per cent.
Volatile or Organic Matter, ...	82·40	36·78	37·784	20·469	1·08	0·58	58·253	1·66
Greasy or Oil Matter (Ether Extract)	28·90	13·30	13·253	7·404	0·36	0·20	20·657	0·58
Mineral Matter, ...	47·24	18·45	21·663	10·274	0·62	0·30	31·937	0·88
Total Suspended Solids,	158·54	68·53	72·700	38·147	2·06	1·08	110·847	3·12

(Amount of Water—2·09 litres (·45 gallon), 1st Rinsing; and 2·5 litres (·55 gallon), 2nd Rinsing.)

first shook and beat the bed on a clean dust-free floor, in order to ascertain if the dried dust and filth could come through the ticking. I found it did so, showing that the tick permits a considerable quantity to escape whenever the bed is shaken or made.

I then sent the whole up to the Sanitary Wash-house at Ruchill, with instructions to the manager to clean out one of the machines thoroughly, weigh the wool-flock very carefully, and then rinse it for half-an-hour in pure cold water. He did so, and sent me the result as follows:—

The two pillows contained 4 lbs. 10 oz. of flock; the bolster, 5 lbs. 4 oz.; the bed, 32 lbs. 3 oz.; or 42 lbs. 1 oz. in all. After half-an-hour's rinsing in the machine, the flock was taken out and dried. It was again weighed most carefully, coming out at 40 lbs. 2 oz.; thus showing a loss of 31 oz., or almost 2 lbs. avoirdupois, or a loss of 4·86 per cent. of the total weight.

The contents of this new bed were, therefore, found to contain a greater percentage of solid matter than was found by the Chemist in his half-pound of selected flock.

In order to present you with an ocular demonstration of the filth which was rinsed out of it, I asked the manager to slowly evaporate the rinsings until they could be contained in a Winchester bottle. The bottle is before you. This black, dirty-looking mass I pour out into a receiver on the table, so that any one may examine it for himself.

You see here a second bottle full of a clear brownish liquor. It contains some of the rinsing passed through filter paper, in order to show the amount of colour which is due to dye alone.

The third bottle shows you part of this filtration distilled, by which, it will be observed, a perfectly clear liquid is again obtained.

Having now satisfied myself as to the extremely obnoxious character of this description of bedding, I asked some of the male and female inspectors to make enquiries in the homes of the lower classes, for the purpose of ascertaining the kinds of bedding the majority sleep upon.

About 2,300 houses in all were visited, in which special investigation was made into the composition of 3,163 beds. The following is the result: — Hair beds, 22; feather beds, 115; clean flock, 37; cotton clippings, 103; straw, 371; chaff, 39; shavings, 4; old clothes, 1; and common flock, 2,471.

Hence we find that 78 per cent. of the beds the common people nightly seek their repose upon are stuffed with that most pernicious material. How is this abominable material chosen? There can only be one answer: because it is cheap, and the people are ignorant of its real nature.

The glazed case you see here contains twelve samples of flocks kindly furnished me by a well-known English firm who manufacture all kinds. Under each sample the price is clearly marked. I need only direct your special attention to the common unwashed flock (No. 3), sold at 4s. 6d. per cwt. all over the country; and the better class, which is free from filth and is sold against it, namely, No. 7, called "grey millpuff," at 9s. 3d. per cwt. I am informed by the makers that the millpuff is ground almost to a pulp, which is kept in a moving stream of pure water for three-quarters of an hour.

Now, assuming a complete bed and pillows contain 42 lbs. of material, the whole difference to the public between that clean-looking grey millpuff and the dirty unwashed wool flock so much in use is only 1s. $9\frac{1}{4}$d. per bed; while, if we take the washed woollen millpuff at 10s. per cwt., the difference is not over 2s. per bed. Beds are not purchased so often by the people as to make a difference of 2s. felt, even by the humblest, and in any event it is clearly against the public interest that this vile material should be dispersed broadcast over the country. Even the makers of this stuff have conscience enough to reprobate its use. The owner of the factory from which I took the sample called upon me the following day, and in the conversation which followed he stated that he had often wondered that its manufacture and sale were not put a stop to. He admitted it was a filthy and

dangerous material, but he had to make it in self-defence, and even as it was he was under-cut in price in the Glasgow market by manufacturers in Yorkshire. In conversation since with several bedding manufacturers, cushion makers, and chair and sofa furnishers, I found all were of one mind about it, but none dare decline to sell it for fear of losing business.

If anyone can still be found to support its continued sale, let me tell him what Dr. Buchanan, our City Bacteriologist, has written me about it. I give you the report in his own words:—

"Seven specimens of 'flock' were received from you for bacteriological examination on the 17th of February last. The specimens comprised seven different qualities of flock, as sent out by manufacturers for use in upholstering and mattress-making.

"In view of the fact—which has been demonstrated in our presence—that this material is frequently made from rags and cast-off clothing gathered from ash-pits, the bacteriological examination was undertaken to determine, from the number and kind of bacteria present, the amount of cleansing or disinfection to which the materials had been subjected in the course of manufacture.

"Cultures were made as follows:—A definite quantity by weight of each sample of flock—namely, $\frac{1}{10}$ gramme—was thoroughly washed in 100 cc. of sterilised water. A definite volume (1 cc.) of the washing was diluted, so that the quantity ultimately added to the culture media represented the washings of $\frac{1}{10,000}$ gramme of flock. The results are computed as the number of bacteria in the washings of 1 gramme of flock. The figures can only be taken as an approximate indication of the numbers present, as the simple process of washing could only set free bacteria approximately representing the whole number in the material.

"Two culture media (agar and gelatine) were used, in order to determine growth at blood heat and the temperature of the air.

"The samples were examined on two occasions, at an interval of about three months; and, while the results of the second examination show a tendency to diminution of the bacteria, they at the same time show a general agreement with those of the first examination.

"The experiments very clearly show that the different lots varied either in original cleanliness or in the processes through which they had been passed. The results obtained with 'common unwashed flock' are what might be expected from material gathered from such a source as that already mentioned. They indicate an amount of uncleanliness in the form of *live potential dirt* that is shocking to contemplate, when one considers the purpose for which the material is used. In the other samples of the first set, A, there is evidence of insufficient cleansing, and certainly no indication that any process of disinfection has been carried out. In the samples of set B there is evidence, in the relatively small number of bacteria, of marked improvement.* Taking sample B1, which may be compared with A1, there is such a wholesome difference in the numbers—10,000, say, as compared with 4,500,000—as to indicate, if not thorough washing, at least some attempt at disinfection. (It may be mentioned by way of comparison that the average number of bacteria in the same quantity of Loch Katrine water for the year 1903 was 75, and that the average of 32 examinations of Glasgow crude sewage was no more than 197,500.)

"The results of the examination reveal a state of matters calling for remedial action."

When we consider this expert opinion, and look at the figures on the bacteriological table on page 11, which confirm those of our Corporation Chemist, it is with difficulty that we are restrained from giving vent to feelings of indignation that, as executive sanitary officials, we have been for so long powerless to cope with a widespread evil in every way calculated to bring disease into the closest

* It was afterwards admitted by the manufacturer of the samples B. that he had subjected them to a high temperature in a stove.

proximity with our labouring population. It would be manifestly safer to sleep on a bed filled with sewage than on this material, upon which, as I have shown, 78 per cent. of our humbler fellow-citizens are nightly reposing.

The figures can only be suitably described as *appalling* in their suggestiveness, for again, remember that it is not only the 78 per cent. of our humbler classes who are in danger from this material in their homes, but every West-end lady who, with severe and unthinking economy, purchases one of these "cheap and nasty" beds for her servant, takes into her otherwise well-appointed home a centre of disease potentiality. Filth in or about the servant may mean disease in her household.

Finally, let me express the hope that, now the facts are known, the Government will lose as little time as possible in passing a measure which will enable all Local Authorities to *sample* bedding both in the premises of flock manufacturers and in those who *sell* beds, sofas, couches, and cushions, and that punishment may follow every sale of any such material which does not conform to a certain standard of cleanliness and freedom from microbial impurity. What that standard may be I leave to the judgment of biological experts, but I trust we shall all be unanimous in the desire to see, at the very earliest date, a severe restriction put on the manufacture and sale of such material as I have had the honour to draw your attention to.

TABLE II.

BACTERIOLOGICAL EXAMINATION OF "FLOCKS."

By Dr. Buchanan.

Sample (Laboratory Mark).	Mark affixed by Manufacturers.	Condition.	Structure.	Value per Ton.	First Examination, 17th February, 1904.		Second Examination, 26th May, 1904.	
					Bacteria in 1 gramme of Flock.		Bacteria in 1 gramme of Flock.	
					At Blood Heat.	At Temp. of Air.	At Blood Heat.	At Temp. of Air.
A 1	"Common"	"Unwashed"	"Common Wool"	£8	4,500,000	18,900,000	2,600,000	4,800,000
2	"No. 1½"	"Supposed to be washed"	"Light Wool"	£12	2,170,000	4,390,000	1,800,000	3,800,000
3	"No. 3"	,,	"Grey Wool"	£8 10/	700,000	350,000	530,000	540,000
4	"No. 4"	,,	"White Wool"	£14 10/	2,000,000	2,300,000	1,400,000	1,920,000
B 1	"1½"	Not stated	"Common Wool"	...	10,000	90,000	20,000	20,000
2	"2¾"	,,	"Carpet Wool"	...	140,000	100,000	60,000	130,000
3	"3"	,,	"Wool and Cotton"	...	210,000	230,000	200,000	250,000

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